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Rec'd PCT/PTO 10 OCT 2002

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LeA33955-US
SEQUENCE LISTING

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<120> Nucleic acids coding for enzyme activities of
spinosyn biosynthesis

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agc cag gtg caa gtg gcc atc gcc gct gat tgc gca cgc gaa cgc gga 336
Ser Gln Val Gln Val Ala Ile Ala Ala Asp Cys Ala Arg Glu Arg Gly
100 105 110

```

LeA33955-US

| | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| cta | agc | cac | cgg | gtg | gac | ttc | tcg | tgc | gtc | gat | gcc | atg | tcc | ctg | ccg | 384 |
| Leu | Ser | His | Arg | Val | Asp | Phe | Ser | Cys | Val | Asp | Ala | Met | Ser | Leu | Pro | |
| | | 115 | | | | | 120 | | | | | 125 | | | | |
| tac | ccg | gac | aat | gct | ttc | gac | gcc | gcc | tgg | gcc | atg | cag | tcg | ctg | ttg | 432 |
| Tyr | Pro | Asp | Asn | Ala | Phe | Asp | Ala | Ala | Trp | Ala | Met | Gln | Ser | Leu | Leu | |
| | 130 | | | | | 135 | | | | | 140 | | | | | |
| gag | atg | tcc | gaa | ccg | gac | cgt | gcc | atc | cgg | gaa | atc | ctt | cga | gta | ctc | 480 |
| Glu | Met | Ser | Glu | Pro | Asp | Arg | Ala | Ile | Arg | Glu | Ile | Leu | Arg | Val | Leu | |
| | 145 | | | | 150 | | | | | 155 | | | | | 160 | |
| aaa | ccc | ggg | ggc | atc | ctc | ggc | gtc | acc | gag | gtc | gtc | aaa | cga | gaa | gcg | 528 |
| Lys | Pro | Gly | Gly | Ile | Leu | Gly | Val | Thr | Glu | Val | Val | Lys | Arg | Glu | Ala | |
| | | | | 165 | | | | | 170 | | | | | 175 | | |
| ggc | ggc | ggg | atg | ccg | gtg | tcc | ggg | gac | agg | tgg | ccg | acc | ggc | ctt | cgg | 576 |
| Gly | Gly | Gly | Met | Pro | Val | Ser | Gly | Asp | Arg | Trp | Pro | Thr | Gly | Leu | Arg | |
| | | | 180 | | | | | 185 | | | | | 190 | | | |
| atc | tgc | ctg | gct | gag | caa | ctt | ctg | gaa | tcg | ctg | cgt | gca | gcg | ggg | ttc | 624 |
| Ile | Cys | Leu | Ala | Glu | Gln | Leu | Leu | Glu | Ser | Leu | Arg | Ala | Ala | Gly | Phe | |
| | | 195 | | | | | 200 | | | | | 205 | | | | |
| gag | atc | ctc | gat | tgg | gag | gac | gtg | tcg | tcg | agg | acc | cgg | tac | ttc | atg | 672 |
| Glu | Ile | Leu | Asp | Trp | Glu | Asp | Val | Ser | Ser | Arg | Thr | Arg | Tyr | Phe | Met | |
| | 210 | | | | | 215 | | | | | 220 | | | | | |
| ccg | cag | ttc | gcc | gaa | gag | ctc | gct | gcg | cac | cag | cac | ggg | atc | gcg | gac | 720 |
| Pro | Gln | Phe | Ala | Glu | Glu | Leu | Ala | Ala | His | Gln | His | Gly | Ile | Ala | Asp | |
| | 225 | | | | 230 | | | | | 235 | | | | | 240 | |
| agg | tac | ggg | ccg | gct | gtc | gcc | ggc | tgg | gcc | gcc | gcg | gtc | tgc | gat | tat | 768 |
| Arg | Tyr | Gly | Pro | Ala | Val | Ala | Gly | Trp | Ala | Ala | Ala | Val | Cys | Asp | Tyr | |
| | | | | 245 | | | | | 250 | | | | | 255 | | |
| gag | aaa | tat | gcc | cac | gac | atg | ggc | tat | gcg | att | ctg | acg | gcg | cgg | aag | 816 |
| Glu | Lys | Tyr | Ala | His | Asp | Met | Gly | Tyr | Ala | Ile | Leu | Thr | Ala | Arg | Lys | |
| | | | 260 | | | | | 265 | | | | | 270 | | | |
| ccg | gtc | ggc | tga | | | | | | | | | | | | | 828 |
| Pro | Val | Gly | | | | | | | | | | | | | | |
| | | 275 | | | | | | | | | | | | | | |

<210> 8

<211> 275

<212> PRT

<213> Saccharopolyspora spinosa

<400> 8

Val Leu Pro Gly Gly Ala Pro Thr Ser Gln Gln Val Gly Gln Met Tyr
1 5 10 15

Asp Leu Val Thr Pro Leu Leu Asn Ser Val Ala Gly Gly Pro Cys Ala
20 25 30

Ile His His Gly Tyr Trp Glu Asn Asp Gly Arg Ala Ser Trp Gln Gln
35 40 45

Ala Ala Asp Arg Leu Thr Asp Leu Val Ala Glu Arg Thr Val Leu Asp
50 55 60

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Gly Gly Val Arg Leu Leu Asp Val Gly Cys Gly Thr Gly Gln Pro Ala
65 70 75 80
Leu Arg Val Ala Arg Asp Asn Ala Ile Gln Ile Thr Gly Ile Thr Val
85 90 95
Ser Gln Val Gln Val Ala Ile Ala Ala Asp Cys Ala Arg Glu Arg Gly
100 105 110
Leu Ser His Arg Val Asp Phe Ser Cys Val Asp Ala Met Ser Leu Pro
115 120 125
Tyr Pro Asp Asn Ala Phe Asp Ala Ala Trp Ala Met Gln Ser Leu Leu
130 135 140
Glu Met Ser Glu Pro Asp Arg Ala Ile Arg Glu Ile Leu Arg Val Leu
145 150 155 160
Lys Pro Gly Gly Ile Leu Gly Val Thr Glu Val Val Lys Arg Glu Ala
165 170 175
Gly Gly Gly Met Pro Val Ser Gly Asp Arg Trp Pro Thr Gly Leu Arg
180 185 190
Ile Cys Leu Ala Glu Gln Leu Leu Glu Ser Leu Arg Ala Ala Gly Phe
195 200 205
Glu Ile Leu Asp Trp Glu Asp Val Ser Ser Arg Thr Arg Tyr Phe Met
210 215 220
Pro Gln Phe Ala Glu Glu Leu Ala Ala His Gln His Gly Ile Ala Asp
225 230 235 240
Arg Tyr Gly Pro Ala Val Ala Gly Trp Ala Ala Ala Val Cys Asp Tyr
245 250 255
Glu Lys Tyr Ala His Asp Met Gly Tyr Ala Ile Leu Thr Ala Arg Lys
260 265 270
Pro Val Gly
275

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<213> Saccharopolyspora spinosa

<220>
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<223> ORF2; glycosyltransferase

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Met Arg Val Leu Val Val Pro Leu Pro Tyr Pro Thr His Leu Met Ala
1 5 10 15
atg gtg ccg ctg tgc tgg gcg ctg caa gca tcc ggg cac gag gtc ctg 96
Met Val Pro Leu Cys Trp Ala Leu Gln Ala Ser Gly His Glu Val Leu
20 25 30

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| | | | | | | | | | | | | | | | | |
|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-----|
| atc Ile | gcc Ala | gca Ala 35 | cca Pro | cca Pro | gag Glu | ctg Leu | cag Gln 40 | gcg Ala | acc Thr | gcg Ala | cat His | ggt Gly 45 | gca Ala | ggt Gly | ctc Leu | 144 |
| acc Thr | acg Thr 50 | gcc Ala | ggg Gly | atc Ile | cgc Arg | ggg Gly 55 | aac Asn | gac Asp | agg Arg | acc Thr | ggc Gly 60 | gat Asp | acg Thr | ggt Gly | gga Gly | 192 |
| acc Thr 65 | acg Thr | cag Gln | ctg Leu | cgc Arg | ttt Phe 70 | ccc Pro | aat Asn | ccg Pro | gcg Ala | ttc Phe 75 | ggt Gly | cag Gln | cgc Arg | gac Asp | acc Thr 80 | 240 |
| gag Glu | gca Ala | ggc Gly | cgg Arg | caa Gln 85 | ctg Leu | tgg Trp | gag Glu | cag Gln | acc Thr 90 | gcg Ala | tcc Ser | aat Asn | gtc Val | gcg Ala 95 | caa Gln | 288 |
| agc Ser | tcg Ser | ctc Leu | gat Asp 100 | cag Gln | ctc Leu | ccc Pro | gaa Glu | tac Tyr 105 | ctt Leu | cga Arg | ctg Leu | gcc Ala 110 | gag Glu | gcc Ala | tgg Trp | 336 |
| cga Arg | ccg Pro | tca Ser 115 | gtg Val | ctg Leu | ttg Leu | gtc Val | gac Asp 120 | gtc Val | tgc Cys | gcg Ala | ctg Leu | atc Ile 125 | ggc Gly | cgg Arg | gtg Val | 384 |
| ctc Leu | ggc Gly 130 | gga Gly | ttg Leu | ctc Leu | gac Asp | ctg Leu 135 | ccg Pro | gtc Val | gtg Val | ctg Leu | cac His 140 | cgc Arg | tgg Trp | gga Gly | gtc Val | 432 |
| gac Asp 145 | ccc Pro | acc Thr | gca Ala | ggc Gly | ccc Pro 150 | ttc Phe | agc Ser | gat Asp | cga Arg | gcc Ala 155 | cac His | gag Glu | ttg Leu | ctt Leu | gac Asp 160 | 480 |
| ccg Pro | gtg Val | tgc Cys | cgg Arg | cac His 165 | cac His | gga Gly | ctg Leu | acc Thr | ggc Gly 170 | ctg Leu | ccc Pro | act Thr | ccc Pro | gag Glu 175 | ctc Leu | 528 |
| atc Ile | ctc Leu | gat Asp 180 | ccc Pro | tgt Cys | ccg Pro | ccg Pro | agc Ser | ctg Leu 185 | caa Gln | gca Ala | agc Ser | gac Asp | gcg Ala 190 | ccg Pro | caa Gln | 576 |
| ggc Gly | gca Ala | ccg Pro 195 | gtc Val | cag Gln | tac Tyr | gtg Val | ccg Pro 200 | tac Tyr | aac Asn | gga Gly | agc Ser | ggc Gly 205 | gca Ala | ttc Phe | ccg Pro | 624 |
| gca Ala | tgg Trp 210 | ggc Gly | gcg Ala | gcg Ala | cgc Arg | acc Thr 215 | tca Ser | gca Ala | cgg Arg | cgg Arg | gtc Val 220 | tgc Cys | atc Ile | tgc Cys | atg Met | 672 |
| ggc Gly 225 | cgc Arg | atg Met | gtg Val | ctg Leu | aac Asn 230 | gcc Ala | acc Thr | ggg Gly | ccg Pro | gct Ala 235 | ccg Pro | ctg Leu | ctg Leu | cgc Arg | gca Ala 240 | 720 |
| gta Val | gcg Ala | gct Ala | gcc Ala | acc Thr 245 | gag Glu | ttg Leu | ccc Pro | ggc Gly | gtc Val 250 | gag Glu | gcc Ala | gtg Val | atc Ile | gcc Ala 255 | gtt Val | 768 |
| ccc Pro | ccc Pro | gag Glu | cac His 260 | cgg Arg | gca Ala | ctt Leu | ctc Leu | acc Thr 265 | gac Asp | cta Leu | ccc Pro | gac Asp | aac Asn | gcc Ala | cgg Arg | 816 |
| atc Ile | gcc Ala | gaa Glu | tcg Ser | gtc Val | ccg Pro | ctc Leu | aac Asn | ctg Leu | ttc Phe | ctg Leu | cgt Arg | acc Thr | tgc Cys | gag Glu | ctg Leu | 864 |

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| 275 | 280 | 285 | |
|--|-----|-----|------|
| gtc atc tgc gcg ggc ggc tcg gga acg gca ttc acc gcg acc cga ctc Val Ile Cys Ala Gly Gly Ser Gly Thr Ala Phe Thr Ala Thr Arg Leu | | | 912 |
| 290 | 295 | 300 | |
| ggc atc ccg caa ctc gtg ctt ccc cag tac ttc gac cag ttc gac tac Gly Ile Pro Gln Leu Val Leu Pro Gln Tyr Phe Asp Gln Phe Asp Tyr | | | 960 |
| 305 | 310 | 315 | 320 |
| gcg cgc aac ctc gcc gct gcc ggg gcg ggc atc tgc ttg ccg gat gag Ala Arg Asn Leu Ala Ala Ala Gly Ala Gly Ile Cys Leu Pro Asp Glu | | | 1008 |
| 325 | 330 | 335 | |
| cag gcc cag tcc gac cac gaa cag ttc acc gac tca atc gca acg gtg Gln Ala Gln Ser Asp His Glu Gln Phe Thr Asp Ser Ile Ala Thr Val | | | 1056 |
| 340 | 345 | 350 | |
| ctc ggc gac acc ggc ttc gct gct gcg gca atc aaa ctc agc gac gag Leu Gly Asp Thr Gly Phe Ala Ala Ala Ile Lys Leu Ser Asp Glu | | | 1104 |
| 355 | 360 | 365 | |
| atc acg gcc atg ccc cat ccc gcc gcg ctg gtg cgg acg ctg gag aac Ile Thr Ala Met Pro His Pro Ala Ala Leu Val Arg Thr Leu Glu Asn | | | 1152 |
| 370 | 375 | 380 | |
| act gcg gcc atc cgt gcc tga Thr Ala Ala Ile Arg Ala | | | 1173 |
| 385 | 390 | | |

<210> 10
 <211> 390
 <212> PRT
 <213> Saccharopolyspora spinosa

<400> 10
 Met Arg Val Leu Val Val Pro Leu Pro Tyr Pro Thr His Leu Met Ala
 1 5 10 15
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 20 25 30
 Ile Ala Ala Pro Pro Glu Leu Gln Ala Thr Ala His Gly Ala Gly Leu
 35 40 45
 Thr Thr Ala Gly Ile Arg Gly Asn Asp Arg Thr Gly Asp Thr Gly Gly
 50 55 60
 Thr Thr Gln Leu Arg Phe Pro Asn Pro Ala Phe Gly Gln Arg Asp Thr
 65 70 75 80
 Glu Ala Gly Arg Gln Leu Trp Glu Gln Thr Ala Ser Asn Val Ala Gln
 85 90 95
 Ser Ser Leu Asp Gln Leu Pro Glu Tyr Leu Arg Leu Ala Glu Ala Trp
 100 105 110
 Arg Pro Ser Val Leu Leu Val Asp Val Cys Ala Leu Ile Gly Arg Val
 115 120 125
 Leu Gly Gly Leu Leu Asp Leu Pro Val Val Leu His Arg Trp Gly Val
 130 135 140

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Asp Pro Thr Ala Gly Pro Phe Ser Asp Arg Ala His Glu Leu Leu Asp
 145 150 155 160
 Pro Val Cys Arg His His Gly Leu Thr Gly Leu Pro Thr Pro Glu Leu
 165 170 175
 Ile Leu Asp Pro Cys Pro Pro Ser Leu Gln Ala Ser Asp Ala Pro Gln
 180 185 190
 Gly Ala Pro Val Gln Tyr Val Pro Tyr Asn Gly Ser Gly Ala Phe Pro
 195 200 205
 Ala Trp Gly Ala Ala Arg Thr Ser Ala Arg Arg Val Cys Ile Cys Met
 210 215 220
 Gly Arg Met Val Leu Asn Ala Thr Gly Pro Ala Pro Leu Leu Arg Ala
 225 230 235 240
 Val Ala Ala Ala Thr Glu Leu Pro Gly Val Glu Ala Val Ile Ala Val
 245 250 255
 Pro Pro Glu His Arg Ala Leu Leu Thr Asp Leu Pro Asp Asn Ala Arg
 260 265 270
 Ile Ala Glu Ser Val Pro Leu Asn Leu Phe Leu Arg Thr Cys Glu Leu
 275 280 285
 Val Ile Cys Ala Gly Gly Ser Gly Thr Ala Phe Thr Ala Thr Arg Leu
 290 295 300
 Gly Ile Pro Gln Leu Val Leu Pro Gln Tyr Phe Asp Gln Phe Asp Tyr
 305 310 315 320
 Ala Arg Asn Leu Ala Ala Ala Gly Ala Gly Ile Cys Leu Pro Asp Glu
 325 330 335
 Gln Ala Gln Ser Asp His Glu Gln Phe Thr Asp Ser Ile Ala Thr Val
 340 345 350
 Leu Gly Asp Thr Gly Phe Ala Ala Ala Ile Lys Leu Ser Asp Glu
 355 360 365
 Ile Thr Ala Met Pro His Pro Ala Ala Leu Val Arg Thr Leu Glu Asn
 370 375 380
 Thr Ala Ala Ile Arg Ala
 385 390

<210> 11
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 <212> DNA
 <213> Saccharopolyspora spinosa

<220>
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 <222> (1)..(750)
 <223> ORF3; O-methyltransferase

<400> 11
 atg ccc tcc cag aac gcg ctg tac ctg gac ctg ctc aag aag gta ctc 48
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| LeA33955-US | | | | | | | | | | | | | | | | |
|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-----|
| Met 1 | Pro | Ser | Gln | Asn 5 | Ala | Leu | Tyr | Leu | Asp 10 | Leu | Leu | Lys | Lys | Val 15 | Leu | |
| acc Thr | aac Asn | acg Thr | att Ile 20 | tac Tyr | agt Ser | gat Asp | cgg Arg | ccg Pro 25 | cat His | ccg Pro | aac Asn | gcc Ala | tgg Trp 30 | cag Gln | gac Asp | 96 |
| aac Asn | acc Thr | gac Asp 35 | tac Tyr | agg Arg | cag Gln | gcc Ala | gct Ala 40 | cgg Arg | gcc Ala | aaa Lys | ggc Gly | acg Thr 45 | gac Asp | tgg Trp | cca Pro | 144 |
| act Thr | gtc Val 50 | gcg Ala | cac His | acg Thr | atg Met | atc Ile 55 | ggt Gly | ctg Leu | gag Glu | cgg Arg | ctg Leu 60 | gac Asp | aac Asn | ctc Leu | cag Gln | 192 |
| cac His 65 | tgc Cys | gtg Val | gaa Glu | gcc Ala | gtg Val 70 | ctc Leu | gca Ala | gac Asp | ggt Gly | gtt Val 75 | ccc Pro | ggg Gly | gat Asp | ttc Phe | gcc Ala 80 | 240 |
| gag Glu | acc Thr | ggt Gly | gtc Val | tgg Trp 85 | cgg Arg | ggc Gly | ggc Gly | gca Ala | tgc Cys 90 | atc Ile | ttc Phe | atg Met | cgc Arg | gcg Ala 95 | gtt Val | 288 |
| ctc Leu | cag Gln | gca Ala | ttc Phe 100 | gga Gly | gat Asp | acc Thr | gga Gly | cgt Arg 105 | acc Thr | gtc Val | tgg Trp | gta Val 110 | gtg Val | gat Asp | tcc Ser | 336 |
| ttc Phe | cag Gln | gga Gly 115 | atg Met | ccg Pro | gaa Glu | agc Ser | tct Ser 120 | gcg Ala | caa Gln | gac Asp | cac His | caa Gln 125 | gcg Ala | gac Asp | cag Gln | 384 |
| gct Ala 130 | atg Met | gcg Ala | ctg Leu | cac His | gag Glu | tac Tyr 135 | aac Asn | gac Asp | gtg Val | ctt Leu | ggc Gly 140 | gta Val | tcg Ser | ctt Leu | gag Glu | 432 |
| acc Thr 145 | gtc Val | cgg Arg | cag Gln | aac Asn | ttc Phe 150 | gcc Ala | cgc Arg | tac Tyr | ggg Gly | ctg Leu 155 | ctc Leu | gac Asp | gaa Glu | cag Gln | gtc Val 160 | 480 |
| agg Arg | ttc Phe | ctc Leu | ccc Pro | ggc Gly 165 | tgg Trp | ttc Phe | cgg Arg | gac Asp | acc Thr 170 | ttg Leu | ccc Pro | acc Thr | gcc Ala | ccc Pro 175 | atc Ile | 528 |
| cag Gln | gaa Glu | ctc Leu | gcc Ala 180 | gtg Val | cta Leu | cga Arg | ctc Leu | gac Asp 185 | ggc Gly | gac Asp | ctc Leu | tac Tyr | gaa Glu 190 | tcc Ser | aca Thr | 576 |
| atg Met | gac Asp | tca Ser 195 | ttg Leu | cgg Arg | aac Asn | ctg Leu | tac Tyr 200 | ccg Pro | aag Lys | ctc Leu | tcg Ser | ccg Pro 205 | ggc Gly | gga Gly | ttc Phe | 624 |
| gtc Val | atc Ile 210 | atc Ile | gac Asp | gac Asp | tat Tyr | ttt Phe 215 | ctg Leu | ccg Pro | tcc Ser | tgc Cys | cag Gln 220 | gac Asp | gcg Ala | gtg Val | aag Lys | 672 |
| ggg Gly 225 | ttc Phe | cgc Arg | gcg Ala | gaa Glu | ctc Leu 230 | ggg Gly | atc Ile | acg Thr | gaa Glu | ccc Pro 235 | atc Ile | cac His | gac Asp | atc Ile | gac Asp 240 | 720 |
| ggc Gly | acg Thr | ggc Gly | gcc Ala | tac Tyr 245 | tgg Trp | cgc Arg | cgc Arg | agc Ser | tgg Trp 250 | tga | | | | | | 753 |

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<210> 12
 <211> 250
 <212> PRT
 <213> Saccharopolyspora spinosa

<400> 12
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 1 5 10 15
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 Asn Thr Asp Tyr Arg Gln Ala Ala Arg Ala Lys Gly Thr Asp Trp Pro
 35 40 45
 Thr Val Ala His Thr Met Ile Gly Leu Glu Arg Leu Asp Asn Leu Gln
 50 55 60
 His Cys Val Glu Ala Val Leu Ala Asp Gly Val Pro Gly Asp Phe Ala
 65 70 75 80
 Glu Thr Gly Val Trp Arg Gly Gly Ala Cys Ile Phe Met Arg Ala Val
 85 90 95
 Leu Gln Ala Phe Gly Asp Thr Gly Arg Thr Val Trp Val Val Asp Ser
 100 105 110
 Phe Gln Gly Met Pro Glu Ser Ser Ala Gln Asp His Gln Ala Asp Gln
 115 120 125
 Ala Met Ala Leu His Glu Tyr Asn Asp Val Leu Gly Val Ser Leu Glu
 130 135 140
 Thr Val Arg Gln Asn Phe Ala Arg Tyr Gly Leu Leu Asp Glu Gln Val
 145 150 155 160
 Arg Phe Leu Pro Gly Trp Phe Arg Asp Thr Leu Pro Thr Ala Pro Ile
 165 170 175
 Gln Glu Leu Ala Val Leu Arg Leu Asp Gly Asp Leu Tyr Glu Ser Thr
 180 185 190
 Met Asp Ser Leu Arg Asn Leu Tyr Pro Lys Leu Ser Pro Gly Gly Phe
 195 200 205
 Val Ile Ile Asp Asp Tyr Phe Leu Pro Ser Cys Gln Asp Ala Val Lys
 210 215 220
 Gly Phe Arg Ala Glu Leu Gly Ile Thr Glu Pro Ile His Asp Ile Asp
 225 230 235 240
 Gly Thr Gly Ala Tyr Trp Arg Arg Ser Trp
 245 250

<210> 13
 <211> 1188
 <212> DNA
 <213> Saccharopolyspora spinosa

<220>

LeA33955-US

<221> CDS

<222> (1)..(1185)

<223> ORF4; O-methyltransferase

<400> 13

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| Met Ser Glu Ile Ala Val Ala Pro Trp Ser Val Val Glu Arg Leu Leu | |
| 1 5 10 15 | |
| ctc gcg gcg ggt gcg ggc ccg gcg aag ctc cag gaa gca gtg cag gtg | 96 |
| Leu Ala Ala Gly Ala Gly Pro Ala Lys Leu Gln Glu Ala Val Gln Val | |
| 20 25 30 | |
| gcc gga ctg gac gcg gtg gcc gac gcc atc gtc gac gaa ctc gtc gta | 144 |
| Ala Gly Leu Asp Ala Val Ala Asp Ala Ile Val Asp Glu Leu Val Val | |
| 35 40 45 | |
| cgc tgc gat ccg ctg tgc ttg gac gag tgc gtg cga atc ggc ctg gag | 192 |
| Arg Cys Asp Pro Leu Ser Leu Asp Glu Ser Val Arg Ile Gly Leu Glu | |
| 50 55 60 | |
| atc act tct ggc gct cag ctg gtc cgg aga acc gtt gag ctc gat cac | 240 |
| Ile Thr Ser Gly Ala Gln Leu Val Arg Arg Thr Val Glu Leu Asp His | |
| 65 70 75 80 | |
| gca ggc ctg cgg ctc gcg gcg gtc gcc gaa gca gct gct gtt ctc cgg | 288 |
| Ala Gly Leu Arg Leu Ala Ala Val Ala Glu Ala Ala Ala Val Leu Arg | |
| 85 90 95 | |
| ttc gac gcg gtg gat ctg ctg gaa ggc ctc ttc ggc ccg gtt gac ggc | 336 |
| Phe Asp Ala Val Asp Leu Leu Glu Gly Leu Phe Gly Pro Val Asp Gly | |
| 100 105 110 | |
| agg cgg cac aac agc cgt gaa gtc cgc tgg tgc gac agc atg acg cag | 384 |
| Arg Arg His Asn Ser Arg Glu Val Arg Trp Ser Asp Ser Met Thr Gln | |
| 115 120 125 | |
| ttc tgc ccc gac cag ggc ctc gcc ggc gcg cag cgc ctg ctg gcg ttc | 432 |
| Phe Ser Pro Asp Gln Gly Leu Ala Gly Ala Gln Arg Leu Leu Ala Phe | |
| 130 135 140 | |
| cgg aac agg gtg tcc acc gcg gtg cac gcc gtg ctg gcc gca gcc gcc | 480 |
| Arg Asn Arg Val Ser Thr Ala Val His Ala Val Leu Ala Ala Ala Ala | |
| 145 150 155 160 | |
| acc agg cgc gcg gac ctc ggt gcg ctg gca gtc cgc tac gga tcc gac | 528 |
| Thr Arg Arg Ala Asp Leu Gly Ala Leu Ala Val Arg Tyr Gly Ser Asp | |
| 165 170 175 | |
| aaa tgg gcg gac ctg cac tgg tac acc gaa cac tac gag cac cac ttc | 576 |
| Lys Trp Ala Asp Leu His Trp Tyr Thr Glu His Tyr Glu His His Phe | |
| 180 185 190 | |
| tcc cga ttc cag gat gcc ccg gtg cga gtg ttg gaa ata gga atc ggt | 624 |
| Ser Arg Phe Gln Asp Ala Pro Val Arg Val Leu Glu Ile Gly Ile Gly | |
| 195 200 205 | |
| ggt tat cac gca ccc gaa ctc ggt ggt gct tgc ctg cgc atg tgg cag | 672 |
| Gly Tyr His Ala Pro Glu Leu Gly Gly Ala Ser Leu Arg Met Trp Gln | |
| 210 215 220 | |
| cgg tac ttc cgg cga ggt ctc gtt tac ggg ctg gac att ttc gag aaa | 720 |
| Arg Tyr Phe Arg Arg Gly Leu Val Tyr Gly Leu Asp Ile Phe Glu Lys | |

| 225 | LeA33955-US | | | | | | | | | | 235 | 240 | | | | | |
|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|------|--|
| gcc Ala | ggg Gly | aac Asn | gaa Glu | ggg Gly 245 | cac His | cga Arg | gtg Val | cga Arg | aag Lys 250 | ctg Leu | cga Arg | ggt Gly | gac Asp | cag Gln 255 | agc Ser | 768 | |
| gat Asp | gcg Ala | gaa Glu | ttc Phe 260 | ctg Leu | gaa Glu | gac Asp | atg Met | gcg Ala 265 | ggg Gly | aag Lys | atc Ile | ggg Gly | ccg Pro 270 | ttc Phe | gac Asp | 816 | |
| att Ile | gtc Val | atc Ile 275 | gac Asp | gac Asp | ggc Gly | agc Ser | cat His 280 | gtc Val | aac Asn | gac Asp | cac His | gtc Val 285 | aag Lys | aaa Lys | tcc Ser | 864 | |
| ttc Phe | caa Gln 290 | tcc Ser | ctg Leu | ttt Phe | ccg Pro | cac His 295 | gtc Val | cgc Arg | cca Pro | ggt Gly | ggt Gly 300 | ttg Leu | tac Tyr | gtc Val | atc Ile | 912 | |
| gag Glu 305 | gat Asp | ctc Leu | cag Gln | acg Thr | gcg Ala 310 | tac Tyr | tgg Trp | ccc Pro | ggc Gly | tac Tyr 315 | ggc Gly | ggt Gly | cgc Arg | gat Asp | ggg Gly 320 | 960 | |
| gaa Glu | ccc Pro | gcg Ala | gcc Ala | cag Gln 325 | cgc Arg | acc Thr | tcg Ser | atc Ile | gac Asp 330 | atg Met | ctc Leu | aaa Lys | gaa Glu | ctg Leu 335 | atc Ile | 1008 | |
| gac Asp | ggc Gly | ctg Leu | cat His 340 | tat Tyr | cag Gln | gag Glu | cgc Arg | gaa Glu 345 | tcg Ser | cgg Arg | tgc Cys | ggg Gly | acc Thr 350 | gag Glu | ccc Pro | 1056 | |
| tcc Ser | tac Tyr | acg Thr 355 | gaa Glu | cgg Arg | aac Asn | gtg Val | gcg Ala 360 | gcc Ala | ctg Leu | cac His | ttc Phe | tac Tyr 365 | cac His | aac Asn | ctg Leu | 1104 | |
| gta Val 370 | ttc Phe | gtg Val | gag Glu | aaa Lys | ggg Gly | ctc Leu 375 | aac Asn | gct Ala | gag Glu | cct Pro | gcc Ala 380 | gcg Ala | ccg Pro | ggg Gly | ttc Phe | 1152 | |
| gtg Val 385 | ccc Pro | cgg Arg | caa Gln | gcg Ala | ctc Leu 390 | ggc Gly | gtc Val | gag Glu | gac Asp | ggc Gly 395 | tga | | | | | 1188 | |

<210> 14
 <211> 395
 <212> PRT
 <213> Saccharopolyspora spinosa

<400> 14
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 1 5 10 15
 Leu Ala Ala Gly Ala Gly Pro Ala Lys Leu Gln Glu Ala Val Gln Val
 20 25 30
 Ala Gly Leu Asp Ala Val Ala Asp Ala Ile Val Asp Glu Leu Val Val
 35 40 45
 Arg Cys Asp Pro Leu Ser Leu Asp Glu Ser Val Arg Ile Gly Leu Glu
 50 55 60
 Ile Thr Ser Gly Ala Gln Leu Val Arg Arg Thr Val Glu Leu Asp His
 65 70 75 80

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Ala Gly Leu Arg Leu₈₅ Ala Ala Val Ala₉₀ Glu Ala Ala Ala Val Leu₉₅ Arg
Phe Asp Ala Val₁₀₀ Asp Leu Leu Glu Gly₁₀₅ Leu Phe Gly Pro Val₁₁₀ Asp Gly
Arg Arg His₁₁₅ Asn Ser Arg Glu Val₁₂₀ Arg Trp Ser Asp Ser₁₂₅ Met Thr Gln
Phe Ser₁₃₀ Pro Asp Gln Gly Leu₁₃₅ Ala Gly Ala Gln Arg₁₄₀ Leu Leu Ala Phe
Arg₁₄₅ Asn Arg Val Ser Thr₁₅₀ Ala Val His Ala Val₁₅₅ Leu Ala Ala Ala Ala₁₆₀
Thr Arg Arg Ala Asp₁₆₅ Leu Gly Ala Leu Ala Val Arg Tyr Gly Ser₁₇₅ Asp
Lys Trp Ala Asp₁₈₀ Leu His Trp Tyr Thr₁₈₅ Glu His Tyr Glu His₁₉₀ His Phe
Ser Arg Phe₁₉₅ Gln Asp Ala Pro Val₂₀₀ Arg Val Leu Glu Ile₂₀₅ Gly Ile Gly
Gly Tyr₂₁₀ His Ala Pro Glu Leu₂₁₅ Gly Gly Ala Ser Leu₂₂₀ Arg Met Trp Gln
Arg Tyr₂₂₅ Phe Arg Arg Gly₂₃₀ Leu Val Tyr Gly Leu₂₃₅ Asp Ile Phe Glu Lys₂₄₀
Ala Gly Asn Glu Gly₂₄₅ His Arg Val Arg Lys₂₅₀ Leu Arg Gly Asp Gln Ser₂₅₅
Asp Ala Glu Phe₂₆₀ Leu Glu Asp Met Ala₂₆₅ Gly Lys Ile Gly Pro Phe Asp₂₇₀
Ile Val Ile₂₇₅ Asp Asp Gly Ser His₂₈₀ Val Asn Asp His Val₂₈₅ Lys Lys Ser
Phe Gln₂₉₀ Ser Leu Phe Pro His₂₉₅ Val Arg Pro Gly Gly₃₀₀ Leu Tyr Val Ile
Glu Asp Leu Gln Thr Ala₃₁₀ Tyr Trp Pro Gly Tyr₃₁₅ Gly Gly Arg Asp Gly₃₂₀
Glu Pro Ala Ala Gln₃₂₅ Arg Thr Ser Ile Asp₃₃₀ Met Leu Lys Glu Leu₃₃₅ Ile
Asp Gly Leu His₃₄₀ Tyr Gln Glu Arg Glu₃₄₅ Ser Arg Cys Gly Thr₃₅₀ Glu Pro
Ser Tyr Thr₃₅₅ Glu Arg Asn Val Ala₃₆₀ Ala Leu His Phe Tyr₃₆₅ His Asn Leu
Val Phe Val₃₇₀ Glu Lys Gly Leu₃₇₅ Asn Ala Glu Pro Ala₃₈₀ Ala Pro Gly Phe
Val Pro Arg Gln Ala Leu₃₉₀ Gly Val Glu Asp Gly₃₉₅

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<210> 15
 <211> 1620
 <212> DNA
 <213> Saccharopolyspora spinosa
 <220>
 <221> CDS
 <222> (1)..(1617)
 <223> ORF5; C-C linking enzyme, cyclization enzyme

<400> 15
 atg atc tcg gct gcg ggc gaa caa agt gga cca gtc aga aaa gga ggg 48
 Met Ile Ser Ala Ala Gly Glu Gln Ser Gly Pro Val Arg Lys Gly Gly
 1 5 10 15
 gcg gtg ccc gaa ttc cat gac ccg gca ccc atg aat cgt cga acc cca 96
 Ala Val Pro Glu Phe His Asp Pro Ala Pro Met Asn Arg Arg Thr Pro
 20 25 30
 gga aca gag atc acc gtc gag ccc gac gat cct cgt tat ccg gac ctc 144
 Gly Thr Glu Ile Thr Val Glu Pro Asp Asp Pro Arg Tyr Pro Asp Leu
 35 40 45
 gtc gtc ggg cac aac ccc cgt ttc acc gga aaa ccc gaa cgc atc cac 192
 Val Val Gly His Asn Pro Arg Phe Thr Gly Lys Pro Glu Arg Ile His
 50 55 60
 atc gcc agc tcc gcc gaa gac gtc gtg cac gcc gtc gcc gac gcc gtg 240
 Ile Ala Ser Ser Ala Glu Asp Val Val His Ala Val Ala Asp Ala Val
 65 70 75 80
 cgc acc ggc agg cgg gta ggg gtc cgc agc ggc ggg cac tgc ttc gag 288
 Arg Thr Gly Arg Arg Val Gly Val Arg Ser Gly Gly His Cys Phe Glu
 85 90 95
 aat ctc gtt gcg gac ccg gcg atc cga gtg ctc gtc gac ctc tcc gag 336
 Asn Leu Val Ala Asp Pro Ala Ile Arg Val Leu Val Asp Leu Ser Glu
 100 105 110
 ctc aac cgc gtg tac tac gac agc acg cgc ggg gca ttc gcg atc gag 384
 Leu Asn Arg Val Tyr Tyr Asp Ser Thr Arg Gly Ala Phe Ala Ile Glu
 115 120 125
 gcg ggc gcc gcc ctc ggg cag gtg tac cga acc ctg ttc aag aac tgg 432
 Ala Gly Ala Ala Leu Gly Gln Val Tyr Arg Thr Leu Phe Lys Asn Trp
 130 135 140
 ggc gtg acg atc ccg acc ggc gca tgt ccc ggg gtg ggc gca ggc ggg 480
 Gly Val Thr Ile Pro Thr Gly Ala Cys Pro Gly Val Gly Ala Gly Gly
 145 150 155 160
 cac atc ctc ggc ggg gga tac ggc ccg ctg tcg cgc cga ttc ggt tcg 528
 His Ile Leu Gly Gly Gly Tyr Gly Pro Leu Ser Arg Arg Phe Gly Ser
 165 170 175
 gtc gtc gac tac ctt caa ggc gtc gag gtc gtc gtg gtc gac cag gcc 576
 Val Val Asp Tyr Leu Gln Gly Val Glu Val Val Val Val Asp Gln Ala
 180 185 190
 ggt gaa gtg cac atc gtc gag gcc gac cgg aac tcc acg ggc gcc ggt 624
 Gly Glu Val His Ile Val Glu Ala Asp Arg Asn Ser Thr Gly Ala Gly
 195 200 205

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| | | | | | | | | | | | | | | | | |
|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|------|
| cac His | gac Asp 210 | ttg Leu | tgg Trp | tgg Trp | gcg Ala | cac His 215 | acc Thr | ggg Gly | ggc Gly | ggg Gly | ggc Gly 220 | ggc Gly | aac Asn | ttc Phe | ggg Gly | 672 |
| atc Ile 225 | gtc Val | acc Thr | agg Arg | ttt Phe | tgg Trp 230 | ctc Leu | cga Arg | acg Thr | ccg Pro | gac Asp 235 | gtg Val | gtc Val | agc Ser | acc Thr | gac Asp 240 | 720 |
| gcc Ala | gca Ala | gag Glu | ctc Leu | ctg Leu 245 | cca Pro | cgg Arg | ccg Pro | ccc Pro | gcg Ala 250 | aca Thr | gtg Val | ctg Leu | ctc Leu | cga Arg 255 | tcg Ser | 768 |
| ttc Phe | cac His | tgg Trp | ccg Pro 260 | tgg Trp | cac His | gaa Glu | ctg Leu | aca Thr 265 | gag Glu | cag Gln | tca Ser | ttc Phe | gcc Ala 270 | gtg Val | ctc Leu | 816 |
| cta Leu | cag Gln | aac Asn 275 | ttc Phe | ggc Gly | aat Asn | tgg Trp | tac Tyr 280 | gag Glu | cag Gln | cac His | agc Ser | gcg Ala 285 | cct Pro | gaa Glu | tcc Ser | 864 |
| acg Thr | caa Gln 290 | ctc Leu | ggg Gly | ttg Leu | ttc Phe | agc Ser 295 | acg Thr | ctc Leu | gtc Val | tgc Cys | gca Ala 300 | cac His | cgg Arg | caa Gln | gct Ala | 912 |
| ggc Gly 305 | tac Tyr | gtc Val | acg Thr | ctg Leu | aac Asn 310 | gtt Val | cac His | ctg Leu | gac Asp | ggc Gly 315 | acg Thr | gat Asp | ccg Pro | aac Asn | gcg Ala 320 | 960 |
| gaa Glu | cgc Arg | acc Thr | ctg Leu | gcc Ala 325 | gaa Glu | cac His | ctg Leu | tcg Ser | gcg Ala 330 | atc Ile | aac Asn | gcc Ala | cag Gln | gtc Val 335 | ggc Gly | 1008 |
| gtg Val | act Thr | cca Pro | gcc Ala 340 | gaa Glu | ggg Gly | ctg Leu | cgg Arg | gaa Glu 345 | acc Thr | ctg Leu | ccg Pro | tgg Trp | ttg Leu | cga Arg | tcg Ser | 1056 |
| acc Thr | cag Gln | gtg Val 355 | gcc Ala | ggg Gly | gcg Ala | atc Ile | gcc Ala 360 | gaa Glu | ggc Gly | ggc Gly | gaa Glu | ccg Pro 365 | ggc Gly | atg Met | caa Gln | 1104 |
| cgg Arg | acc Thr 370 | aag Lys | gtc Val | aaa Lys | gcc Ala | gcc Ala 375 | tac Tyr | ttg Leu | cgc Arg | acc Thr | ggg Gly 380 | ctg Leu | tcc Ser | gaa Glu | gct Ala | 1152 |
| caa Gln 385 | cta Leu | gcc Ala | acg Thr | gtt Val | tac Tyr 390 | cgg Arg | cgg Arg | ctg Leu | acc Thr | gtc Val 395 | tac Tyr | gga Gly | tac Tyr | gac Asp | aac Asn 400 | 1200 |
| cct Pro | gcg Ala | gcg Ala | gcg Ala | ctg Leu 405 | ttg Leu | ctg Leu | ctc Leu | ggg Gly | tac Tyr 410 | ggc Gly | ggg Gly | atg Met | gcg Ala | aac Asn 415 | gcc Ala | 1248 |
| gtg Val | gct Ala | ccg Pro | tcg Ser 420 | gcc Ala | acc Thr | gca Ala | ctc Leu | gct Ala 425 | cag Gln | cgc Arg | gac Asp | tcg Ser | gtt Val 430 | ctc Leu | aaa Lys | 1296 |
| gcg Ala | ctg Leu | ttc Phe 435 | gtc Val | acg Thr | aac Asn | tgg Trp | tcg Ser 440 | gag Glu | ccc Pro | gcc Ala | gag Glu | gac Asp 445 | gag Glu | cgg Arg | cat His | 1344 |
| ctg Leu | acc Thr 450 | tgg Trp | att Ile | cgc Arg | ggg Gly | ttc Phe 455 | tac Tyr | cgc Arg | gag Glu | atg Met | tac Tyr 460 | gcc Ala | gaa Glu | acc Thr | ggc Gly | 1392 |

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| | |
|---|------|
| gga gtt ccg gtg cca ggt acc cgt gtc gac ggc tcc tac atc aac tac | 1440 |
| Gly Val Pro Val Pro Gly Thr Arg Val Asp Gly Ser Tyr Ile Asn Tyr | |
| 465 470 475 480 | |
| ccg gac acc gac ttg gcc gat cca ttg tgg aac acc tcc ggt gtt gcc | 1488 |
| Pro Asp Thr Asp Leu Ala Asp Pro Leu Trp Asn Thr Ser Gly Val Ala | |
| 485 490 495 | |
| tgg cac gac ctg tac tac aaa gac aac tac ccg cgg ctg cag cgg gcc | 1536 |
| Trp His Asp Leu Tyr Tyr Lys Asp Asn Tyr Pro Arg Leu Gln Arg Ala | |
| 500 505 510 | |
| aaa gcg cgg tgg gat ccg cag aac atc ttc cag cac ggc ctg tcg atc | 1584 |
| Lys Ala Arg Trp Asp Pro Gln Asn Ile Phe Gln His Gly Leu Ser Ile | |
| 515 520 525 | |
| aaa ccg ccg gca cgg ctt tca ccc ggt cag cca tga | 1620 |
| Lys Pro Pro Ala Arg Leu Ser Pro Gly Gln Pro | |
| 530 535 | |

<210> 16
 <211> 539
 <212> PRT
 <213> Saccharopolyspora spinosa

<400> 16
 Met Ile Ser Ala Ala Gly Glu Gln Ser Gly Pro Val Arg Lys Gly Gly
 1 5 10 15
 Ala Val Pro Glu Phe His Asp Pro Ala Pro Met Asn Arg Arg Thr Pro
 20 25 30
 Gly Thr Glu Ile Thr Val Glu Pro Asp Asp Pro Arg Tyr Pro Asp Leu
 35 40 45
 Val Val Gly His Asn Pro Arg Phe Thr Gly Lys Pro Glu Arg Ile His
 50 55 60
 Ile Ala Ser Ser Ala Glu Asp Val Val His Ala Val Ala Asp Ala Val
 65 70 75 80
 Arg Thr Gly Arg Arg Val Gly Val Arg Ser Gly Gly His Cys Phe Glu
 85 90 95
 Asn Leu Val Ala Asp Pro Ala Ile Arg Val Leu Val Asp Leu Ser Glu
 100 105 110
 Leu Asn Arg Val Tyr Tyr Asp Ser Thr Arg Gly Ala Phe Ala Ile Glu
 115 120 125
 Ala Gly Ala Ala Leu Gly Gln Val Tyr Arg Thr Leu Phe Lys Asn Trp
 130 135 140
 Gly Val Thr Ile Pro Thr Gly Ala Cys Pro Gly Val Gly Ala Gly Gly
 145 150 155 160
 His Ile Leu Gly Gly Gly Tyr Gly Pro Leu Ser Arg Arg Phe Gly Ser
 165 170 175
 Val Val Asp Tyr Leu Gln Gly Val Glu Val Val Val Val Asp Gln Ala
 180 185 190

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Gly Glu Val His Ile Val Glu Ala Asp Arg Asn Ser Thr Gly Ala Gly
 195 200 205
 His Asp Leu Trp Trp Ala His Thr Gly Gly Gly Gly Gly Asn Phe Gly
 210 215 220
 Ile Val Thr Arg Phe Trp Leu Arg Thr Pro Asp Val Val Ser Thr Asp
 225 230 235 240
 Ala Ala Glu Leu Leu Pro Arg Pro Pro Ala Thr Val Leu Leu Arg Ser
 245 250 255
 Phe His Trp Pro Trp His Glu Leu Thr Glu Gln Ser Phe Ala Val Leu
 260 265 270
 Leu Gln Asn Phe Gly Asn Trp Tyr Glu Gln His Ser Ala Pro Glu Ser
 275 280 285
 Thr Gln Leu Gly Leu Phe Ser Thr Leu Val Cys Ala His Arg Gln Ala
 290 295 300
 Gly Tyr Val Thr Leu Asn Val His Leu Asp Gly Thr Asp Pro Asn Ala
 305 310 315 320
 Glu Arg Thr Leu Ala Glu His Leu Ser Ala Ile Asn Ala Gln Val Gly
 325 330 335
 Val Thr Pro Ala Glu Gly Leu Arg Glu Thr Leu Pro Trp Leu Arg Ser
 340 345 350
 Thr Gln Val Ala Gly Ala Ile Ala Glu Gly Gly Glu Pro Gly Met Gln
 355 360 365
 Arg Thr Lys Val Lys Ala Ala Tyr Leu Arg Thr Gly Leu Ser Glu Ala
 370 375 380
 Gln Leu Ala Thr Val Tyr Arg Arg Leu Thr Val Tyr Gly Tyr Asp Asn
 385 390 395 400
 Pro Ala Ala Ala Leu Leu Leu Leu Gly Tyr Gly Gly Met Ala Asn Ala
 405 410 415
 Val Ala Pro Ser Ala Thr Ala Leu Ala Gln Arg Asp Ser Val Leu Lys
 420 425 430
 Ala Leu Phe Val Thr Asn Trp Ser Glu Pro Ala Glu Asp Glu Arg His
 435 440 445
 Leu Thr Trp Ile Arg Gly Phe Tyr Arg Glu Met Tyr Ala Glu Thr Gly
 450 455 460
 Gly Val Pro Val Pro Gly Thr Arg Val Asp Gly Ser Tyr Ile Asn Tyr
 465 470 475 480
 Pro Asp Thr Asp Leu Ala Asp Pro Leu Trp Asn Thr Ser Gly Val Ala
 485 490 495
 Trp His Asp Leu Tyr Tyr Lys Asp Asn Tyr Pro Arg Leu Gln Arg Ala
 500 505 510
 Lys Ala Arg Trp Asp Pro Gln Asn Ile Phe Gln His Gly Leu Ser Ile
 515 520 525

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Lys Pro Pro Ala Arg Leu Ser Pro Gly Gln Pro
530 535

<210> 17
<211> 1194
<212> DNA
<213> Saccharopolyspora spinosa

<220>
<221> CDS
<222> (1)..(1191)
<223> ORF6; methyltransferase

```

<400> 17
atg tcc aca acg cac gag atc gaa acc gtg gaa cgc atc atc ctc gcc 48
Met Ser Thr Thr His Glu Ile Glu Thr Val Glu Arg Ile Ile Leu Ala
1 5 10 15

gcc gga tcc agt gcg gcg agc ctg gcc gac ctg acc acc gaa ctc gga 96
Ala Gly Ser Ser Ala Ala Ser Leu Ala Asp Leu Thr Thr Glu Leu Gly
20 25 30

ctc gcc agg atc gca ccc gtg ctg atc gac gag atc ctc ttc cgc gcg 144
Leu Ala Arg Ile Ala Pro Val Leu Ile Asp Glu Ile Leu Phe Arg Ala
35 40 45

gaa ccg gcc ccc gac atc gaa cgg acc gag gtc gcg gtc cag atc acc 192
Glu Pro Ala Pro Asp Ile Glu Arg Thr Glu Val Ala Val Gln Ile Thr
50 55 60

cac cga ggc gag acc gtt gac ttc gtc ctg acg cta cag tcc ggt gag 240
His Arg Gly Glu Thr Val Asp Phe Val Leu Thr Leu Gln Ser Gly Glu
65 70 75 80

ctg atc aag gcc gag caa cga ccg gtc gga gac gtc ccg ctg cgg atc 288
Leu Ile Lys Ala Glu Gln Arg Pro Val Gly Asp Val Pro Leu Arg Ile
85 90 95

ggt tac gag ctc acc gat ctc atc gcc gag ttg ttc ggc cca gga gct 336
Gly Tyr Glu Leu Thr Asp Leu Ile Ala Glu Leu Phe Gly Pro Gly Ala
100 105 110

ccc agg gcc gtc ggc gcc cgg agc acc aac ttc ctc cga acc acc aca 384
Pro Arg Ala Val Gly Ala Arg Ser Thr Asn Phe Leu Arg Thr Thr Thr
115 120 125

tcc ggt tcg ata ccc ggt ccg tcg gaa ctg tcc gat ggc ttc cag gcc 432
Ser Gly Ser Ile Pro Gly Pro Ser Glu Leu Ser Asp Gly Phe Gln Ala
130 135 140

atc tcc gca gtg gtc gcc ggc tgc ggg cac cga cgt ccc gac ctc aac 480
Ile Ser Ala Val Val Ala Gly Cys Gly His Arg Arg Pro Asp Leu Asn
145 150 155 160

ttg ctc gcc tcc cac tac cgc acg gac aag tgg ggc ggc ctg cac tgg 528
Leu Leu Ala Ser His Tyr Arg Thr Asp Lys Trp Gly Gly Leu His Trp
165 170 175

ttc acc ccg cta tac gag cga cac ctc ggc gag ttc cgt gat cgc ccg 576
Phe Thr Pro Leu Tyr Glu Arg His Leu Gly Glu Phe Arg Asp Arg Pro

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| 180 | 185 | 190 | |
|---|---|------|--|
| gtg cgc atc ctg gag atc ggt gtc ggt ggc tac aac ttc gac ggt ggc | Val Arg Ile Leu Glu Ile Gly Val Gly Gly Tyr Asn Phe Asp Gly Gly | 624 | |
| | 195 200 | 205 | |
| ggc ggc gaa tcc ctg aag atg tgg aag cgc tac ttc cac cgc ggc ctc | Gly Gly Glu Ser Leu Lys Met Trp Lys Arg Tyr Phe His Arg Gly Leu | 672 | |
| | 210 215 | 220 | |
| gtg ttc ggg atg gac gtt ttc gac aag tcc ttc ctc gac cag cag agg | Val Phe Gly Met Asp Val Phe Asp Lys Ser Phe Leu Asp Gln Gln Arg | 720 | |
| | 225 230 235 | 240 | |
| ctc tgc acc gtc cgc gcc gac cag agc aag ccc gag gag ctg gcc gcc | Leu Cys Thr Val Arg Ala Asp Gln Ser Lys Pro Glu Glu Leu Ala Ala | 768 | |
| | 245 250 255 | | |
| ggt gac gac aag tac gga ccg ttc gac atc atc atc gac gat ggc agc | Val Asp Asp Lys Tyr Gly Pro Phe Asp Ile Ile Ile Asp Asp Gly Ser | 816 | |
| | 260 265 | 270 | |
| cac atc aac gga cac gtg cgc aca tcc ctg gaa acg ctg ttc ccc cgg | His Ile Asn Gly His Val Arg Thr Ser Leu Glu Thr Leu Phe Pro Arg | 864 | |
| | 275 280 285 | | |
| ttg cgc agc ggt ggc gta tac gtg atc gag gat ctg tgg acg acc tat | Leu Arg Ser Gly Gly Val Tyr Val Ile Glu Asp Leu Trp Thr Thr Tyr | 912 | |
| | 290 295 300 | | |
| gct ccc gga ttc ggc ggg cag gcg cag tgc ccg gcc gca ccc ggc acc | Ala Pro Gly Phe Gly Gly Gln Ala Gln Cys Pro Ala Ala Pro Gly Thr | 960 | |
| | 305 310 315 320 | | |
| acg gtc agc ctg ctc aag aac ctg ttg gaa ggc gtt cag cac gag gag | Thr Val Ser Leu Leu Lys Asn Leu Leu Glu Gly Val Gln His Glu Glu | 1008 | |
| | 325 330 335 | | |
| cag ccg cat gcg ggc tcg tac gag ccg agc tac ctg gaa cgc aat ttg | Gln Pro His Ala Gly Ser Tyr Glu Pro Ser Tyr Leu Glu Arg Asn Leu | 1056 | |
| | 340 345 350 | | |
| gtc ggc ctc cac acc tac cac aac atc gcg ttc ctg gag aaa ggc gtc | Val Gly Leu His Thr Tyr His Asn Ile Ala Phe Leu Glu Lys Gly Val | 1104 | |
| | 355 360 365 | | |
| aac gcc gaa ggc ggc gtt cct gct tgg gtg cca agg agt ctg gac gac | Asn Ala Glu Gly Gly Val Pro Ala Trp Val Pro Arg Ser Leu Asp Asp | 1152 | |
| | 370 375 380 | | |
| ata ttg cac ctg gcc gac gtg aac agc gcg gag gac gag tga | Ile Leu His Leu Ala Asp Val Asn Ser Ala Glu Asp Glu | 1194 | |
| | 385 390 395 | | |

<210> 18

<211> 397

<212> PRT

<213> saccharopolyspora spinosa

<400> 18

| | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Met | Ser | Thr | Thr | His | Glu | Ile | Glu | Thr | Val | Glu | Arg | Ile | Ile | Leu | Ala |
| 1 | | | | 5 | | | | | 10 | | | | | 15 | |

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Ala Gly Ser Ser Ala Ala Ser Leu Ala Asp Leu Thr Thr Glu Leu Gly
20 25 30
Leu Ala Arg Ile Ala Pro Val Leu Ile Asp Glu Ile Leu Phe Arg Ala
35 40 45
Glu Pro Ala Pro Asp Ile Glu Arg Thr Glu Val Ala Val Gln Ile Thr
50 55 60
His Arg Gly Glu Thr Val Asp Phe Val Leu Thr Leu Gln Ser Gly Glu
65 70 75 80
Leu Ile Lys Ala Glu Gln Arg Pro Val Gly Asp Val Pro Leu Arg Ile
85 90 95
Gly Tyr Glu Leu Thr Asp Leu Ile Ala Glu Leu Phe Gly Pro Gly Ala
100 105 110
Pro Arg Ala Val Gly Ala Arg Ser Thr Asn Phe Leu Arg Thr Thr Thr
115 120 125
Ser Gly Ser Ile Pro Gly Pro Ser Glu Leu Ser Asp Gly Phe Gln Ala
130 135 140
Ile Ser Ala Val Val Ala Gly Cys Gly His Arg Arg Pro Asp Leu Asn
145 150 155 160
Leu Leu Ala Ser His Tyr Arg Thr Asp Lys Trp Gly Gly Leu His Trp
165 170 175
Phe Thr Pro Leu Tyr Glu Arg His Leu Gly Glu Phe Arg Asp Arg Pro
180 185 190
Val Arg Ile Leu Glu Ile Gly Val Gly Gly Tyr Asn Phe Asp Gly Gly
195 200 205
Gly Gly Glu Ser Leu Lys Met Trp Lys Arg Tyr Phe His Arg Gly Leu
210 215 220
Val Phe Gly Met Asp Val Phe Asp Lys Ser Phe Leu Asp Gln Gln Arg
225 230 235 240
Leu Cys Thr Val Arg Ala Asp Gln Ser Lys Pro Glu Glu Leu Ala Ala
245 250 255
Val Asp Asp Lys Tyr Gly Pro Phe Asp Ile Ile Ile Asp Asp Gly Ser
260 265 270
His Ile Asn Gly His Val Arg Thr Ser Leu Glu Thr Leu Phe Pro Arg
275 280 285
Leu Arg Ser Gly Gly Val Tyr Val Ile Glu Asp Leu Trp Thr Thr Tyr
290 295 300
Ala Pro Gly Phe Gly Gly Gln Ala Gln Cys Pro Ala Ala Pro Gly Thr
305 310 315 320
Thr Val Ser Leu Leu Lys Asn Leu Leu Glu Gly Val Gln His Glu Glu
325 330 335
Gln Pro His Ala Gly Ser Tyr Glu Pro Ser Tyr Leu Glu Arg Asn Leu
340 345 350

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Val Gly Leu His Thr Tyr His Asn Ile Ala Phe Leu Glu Lys Gly Val
 355 360
 Asn Ala Glu Gly Gly Val Pro Ala Trp Val Pro Arg Ser Leu Asp Asp
 370 375 380
 Ile Leu His Leu Ala Asp Val Asn Ser Ala Glu Asp Glu
 385 390 395

<210> 19
 <211> 900
 <212> DNA
 <213> Saccharopolyspora spinosa

<220>
 <221> CDS
 <222> (1)..(897)
 <223> ORF7; O-methyltransferase

<400> 19
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 Val Asn Ser Arg Gly Ala Asn Thr Gln Ala Phe Pro Thr Ala Asp Gln
 1 5 10 15
 gtg gag tcc atc ttc gat gcg ttg gcg cac ggg cgt ccc ctg cac cac 96
 Val Glu Ser Ile Phe Asp Ala Leu Ala His Gly Arg Pro Leu His His
 20 25 30
 ggt tac tgg gcg ggc ggg tat cgg gag gat gcc ggt gcc aca ccg tgg 144
 Gly Tyr Trp Ala Gly Gly Tyr Arg Glu Asp Ala Gly Ala Thr Pro Trp
 35 40 45
 tcg gat gct gcc gac caa ctg acc gac ctg ttc atc gac aag gcc gcg 192
 Ser Asp Ala Ala Asp Gln Leu Thr Asp Leu Phe Ile Asp Lys Ala Ala
 50 55 60
 ctc cgt ccc gga gcg cac ctg ttc gac ctg ggc tgc ggc aat ggg cag 240
 Leu Arg Pro Gly Ala His Leu Phe Asp Leu Gly Cys Gly Asn Gly Gln
 65 70 75 80
 ccc gta gtc cgt gcg gca tgc gcc agc ggc gtt cga gtc acc gga atc 288
 Pro Val Val Arg Ala Ala Cys Ala Ser Gly Val Arg Val Thr Gly Ile
 85 90 95
 acc gtg aac gcc cag cat ctc gcc gcc gcc acc agg ctc gcc aac gag 336
 Thr Val Asn Ala Gln His Leu Ala Ala Ala Thr Arg Leu Ala Asn Glu
 100 105 110
 acc gga ctg gcc ggc agt ctt gag ttc gat cta gtc gac ggc gcc cag 384
 Thr Gly Leu Ala Gly Ser Leu Glu Phe Asp Leu Val Asp Gly Ala Gln
 115 120 125
 ctg ccc tac ccg gac ggt ttc ttt cag gcc gca tgg gcg atg cag tcc 432
 Leu Pro Tyr Pro Asp Gly Phe Phe Gln Ala Ala Trp Ala Met Gln Ser
 130 135 140
 gtc gtg cag atc gtg gac cag gcc gcc gcg atc cgc gag gtc cac cga 480
 Val Val Gln Ile Val Asp Gln Ala Ala Ala Ile Arg Glu Val His Arg
 145 150 155 160

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| | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| atc | ctg | gaa | ccc | ggc | ggc | cgg | ttc | gtc | ctc | gga | gac | atc | atc | act | cgg | 528 |
| Ile | Leu | Glu | Pro | Gly | Gly | Arg | Phe | Val | Leu | Gly | Asp | Ile | Ile | Thr | Arg | |
| | | | | 165 | | | | | 170 | | | | | 175 | | |
| gtt | cga | ctc | ccg | gaa | gag | tac | gcg | gcg | gtt | tgg | acg | ggc | acg | acc | gcc | 576 |
| Val | Arg | Leu | Pro | Glu | Glu | Tyr | Ala | Ala | Val | Trp | Thr | Gly | Thr | Thr | Ala | |
| | | | 180 | | | | | 185 | | | | | 190 | | | |
| cat | acc | ttg | aac | agc | ttc | acg | gcg | ctg | gtc | agc | gaa | gcc | ggg | ttc | gag | 624 |
| His | Thr | Leu | Asn | Ser | Phe | Thr | Ala | Leu | Val | Ser | Glu | Ala | Gly | Phe | Glu | |
| | | 195 | | | | | 200 | | | | | 205 | | | | |
| att | ctc | gaa | gtc | acc | gac | ctc | acg | gca | cag | acc | agg | tgc | atg | gtc | tcc | 672 |
| Ile | Leu | Glu | Val | Thr | Asp | Leu | Thr | Ala | Gln | Thr | Arg | Cys | Met | Val | Ser | |
| | 210 | | | | | 215 | | | | | 220 | | | | | |
| tgg | tac | gtc | gac | gag | ttg | ctc | cgg | aaa | ctc | gat | gag | ctc | gcc | ggc | gtc | 720 |
| Trp | Tyr | Val | Asp | Glu | Leu | Leu | Arg | Lys | Leu | Asp | Glu | Leu | Ala | Gly | Val | |
| | 225 | | | | 230 | | | | | 235 | | | | | 240 | |
| gag | cct | gcg | gct | gtc | ggc | acc | tac | cag | caa | cgc | tac | ttg | gga | gac | atc | 768 |
| Glu | Pro | Ala | Ala | Val | Gly | Thr | Tyr | Gln | Gln | Arg | Tyr | Leu | Gly | Asp | Ile | |
| | | | | 245 | | | | | 250 | | | | | 255 | | |
| gcg | gcg | aag | cac | gga | ccg | gga | cca | gca | cag | ctg | atc | gcc | gcg | gtt | gcg | 816 |
| Ala | Ala | Lys | His | Gly | Pro | Gly | Pro | Ala | Gln | Leu | Ile | Ala | Ala | Val | Ala | |
| | | | 260 | | | | | 265 | | | | | 270 | | | |
| gaa | tac | cgg | aaa | cat | ccg | gat | tac | gcc | aga | aac | gag | gaa | agc | atg | ggc | 864 |
| Glu | Tyr | Arg | Lys | His | Pro | Asp | Tyr | Ala | Arg | Asn | Glu | Glu | Ser | Met | Gly | |
| | | 275 | | | | | 280 | | | | | 285 | | | | |
| ttc | atg | ctc | ctg | cag | gct | cga | aag | aag | cag | tcc | tga | | | | | 900 |
| Phe | Met | Leu | Leu | Gln | Ala | Arg | Lys | Lys | Gln | Ser | | | | | | |
| | 290 | | | | | 295 | | | | | | | | | | |

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 <213> Saccharopolyspora spinosa

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 Gly Tyr Trp Ala Gly Gly Tyr Arg Glu Asp Ala Gly Ala Thr Pro Trp
 35 40 45
 Ser Asp Ala Ala Asp Gln Leu Thr Asp Leu Phe Ile Asp Lys Ala Ala
 50 55 60
 Leu Arg Pro Gly Ala His Leu Phe Asp Leu Gly Cys Gly Asn Gly Gln
 65 70 75 80
 Pro Val Val Arg Ala Ala Cys Ala Ser Gly Val Arg Val Thr Gly Ile
 85 90 95
 Thr Val Asn Ala Gln His Leu Ala Ala Ala Thr Arg Leu Ala Asn Glu
 100 105 110

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Thr Gly Leu Ala Gly Ser Leu Glu Phe Asp Leu Val Asp Gly Ala Gln
115 120 125
Leu Pro Tyr Pro Asp Gly Phe Phe Gln Ala Ala Trp Ala Met Gln Ser
130 135 140
Val Val Gln Ile Val Asp Gln Ala Ala Ala Ile Arg Glu Val His Arg
145 150 155 160
Ile Leu Glu Pro Gly Gly Arg Phe Val Leu Gly Asp Ile Ile Thr Arg
165 170 175
Val Arg Leu Pro Glu Glu Tyr Ala Ala Val Trp Thr Gly Thr Thr Ala
180 185 190
His Thr Leu Asn Ser Phe Thr Ala Leu Val Ser Glu Ala Gly Phe Glu
195 200 205
Ile Leu Glu Val Thr Asp Leu Thr Ala Gln Thr Arg Cys Met Val Ser
210 215 220
Trp Tyr Val Asp Glu Leu Leu Arg Lys Leu Asp Glu Leu Ala Gly Val
225 230 235 240
Glu Pro Ala Ala Val Gly Thr Tyr Gln Gln Arg Tyr Leu Gly Asp Ile
245 250 255
Ala Ala Lys His Gly Pro Gly Pro Ala Gln Leu Ile Ala Ala Val Ala
260 265 270
Glu Tyr Arg Lys His Pro Asp Tyr Ala Arg Asn Glu Glu Ser Met Gly
275 280 285
Phe Met Leu Leu Gln Ala Arg Lys Lys Gln Ser
290 295

<210> 21
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<212> DNA
<213> Saccharopolyspora spinosa

<220>
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<222> (1)..(1164)
<223> ORF8; cyclization enzyme

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Met Ala Ser Glu His Ala Ser Leu Val Gly Asp Asp Leu Arg Ala Pro
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gcg gat gat ccc ttc tac cga ccg ccg acg ccg cta ccg ccg ggt gtc 96
Ala Asp Asp Pro Phe Tyr Arg Pro Pro Thr Pro Leu Pro Pro Gly Val
20 25 30
ccg ggc acg ctc ctc agg gcc ccg ccc gtc tcg gca ctg cgc ggc acg 144
Pro Gly Thr Leu Leu Arg Ala Arg Pro Val Ser Ala Leu Arg Gly Thr
35 40 45
ggc gaa ccc gtc gca gcc aag gcc tgg caa atc ctc tac cgg tcc aac 192

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| | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Gly | Glu | Pro | Val | Ala | Ala | Lys | Ala | Trp | Gln | Ile | Leu | Tyr | Arg | Ser | Asn | |
| | 50 | | | | | 55 | | | | | 60 | | | | | |
| tcc | gcc | ctt | ggc | atg | ccg | aac | gcc | gtc | tcc | ggc | acc | gtt | ctg | gtg | ccg | 240 |
| Ser | Ala | Leu | Gly | Met | Pro | Asn | Ala | Val | Ser | Gly | Thr | Val | Leu | Val | Pro | |
| 65 | | | | | 70 | | | | | 75 | | | | | 80 | |
| aac | atc | ccg | tgg | ccg | cgc | gaa | gat | cgc | ccc | atc | atc | act | ttc | gca | gtg | 288 |
| Asn | Ile | Pro | Trp | Pro | Arg | Glu | Asp | Arg | Pro | Ile | Ile | Thr | Phe | Ala | Val | |
| | | | | 85 | | | | | 90 | | | | | 95 | | |
| ggc | acc | cac | ggc | ctc | ggc | agc | caa | gtt | gcc | ccg | tcg | tac | ctg | ctt | cga | 336 |
| Gly | Thr | His | Gly | Leu | Gly | Ser | Gln | Val | Ala | Pro | Ser | Tyr | Leu | Leu | Arg | |
| | | | 100 | | | | | 105 | | | | | 110 | | | |
| acc | gga | acc | gag | ccg | gag | acc | gag | ctg | atc | gcc | gtg | gcc | ctc | gac | cgc | 384 |
| Thr | Gly | Thr | Glu | Pro | Glu | Thr | Glu | Leu | Ile | Ala | Val | Ala | Leu | Asp | Arg | |
| | | 115 | | | | | 120 | | | | | 125 | | | | |
| ggg | tgg | gcc | gtg | gtc | atc | acc | gac | tac | gaa | ggc | ctc | ggc | act | cct | gga | 432 |
| Gly | Trp | Ala | Val | Val | Ile | Thr | Asp | Tyr | Glu | Gly | Leu | Gly | Thr | Pro | Gly | |
| | 130 | | | | | 135 | | | | | 140 | | | | | |
| acc | cac | acc | tac | acc | gtc | ggc | agg | gcg | cag | gga | cac | gcc | atg | ctc | gat | 480 |
| Thr | His | Thr | Tyr | Thr | Val | Gly | Arg | Ala | Gln | Gly | His | Ala | Met | Leu | Asp | |
| 145 | | | | | 150 | | | | | 155 | | | | | 160 | |
| gcc | gcc | cgc | gct | gcg | caa | cgg | cta | ccg | ggc | tcc | ggc | ctg | acg | acc | gac | 528 |
| Ala | Ala | Arg | Ala | Ala | Gln | Arg | Leu | Pro | Gly | Ser | Gly | Leu | Thr | Thr | Asp | |
| | | | | 165 | | | | | 170 | | | | | 175 | | |
| tgc | ccg | gtc | ggc | atc | tgg | ggc | tat | gcg | cag | ggc | ggg | caa | gcg | tcg | gcc | 576 |
| Cys | Pro | Val | Gly | Ile | Trp | Gly | Tyr | Ala | Gln | Gly | Gly | Gln | Ala | Ser | Ala | |
| | | | 180 | | | | | 185 | | | | | 190 | | | |
| ttc | gcc | ggc | gaa | ctg | cac | ccc | acc | tac | gca | cct | gaa | ctg | cga | atc | cgc | 624 |
| Phe | Ala | Gly | Glu | Leu | His | Pro | Thr | Tyr | Ala | Pro | Glu | Leu | Arg | Ile | Arg | |
| | | 195 | | | | | 200 | | | | | 205 | | | | |
| gct | gcg | gcc | gca | ggc | gcg | gtg | ccg | atc | gat | ctg | ctg | gac | atc | atc | cac | 672 |
| Ala | Ala | Ala | Ala | Gly | Ala | Val | Pro | Ile | Asp | Leu | Leu | Asp | Ile | Ile | His | |
| | 210 | | | | | 215 | | | | | 220 | | | | | |
| cga | aat | gac | ggg | gtg | ttc | acc | ggg | ccg | gtg | ctg | gcc | ggc | ctg | gtc | ggg | 720 |
| Arg | Asn | Asp | Gly | Val | Phe | Thr | Gly | Pro | Val | Leu | Ala | Gly | Leu | Val | Gly | |
| 225 | | | | | 230 | | | | | 235 | | | | | 240 | |
| cat | gcc | gct | gcc | tac | ccc | gat | ctg | cca | ttc | gac | gag | ctt | ctc | acc | gaa | 768 |
| His | Ala | Ala | Ala | Tyr | Pro | Asp | Leu | Pro | Phe | Asp | Glu | Leu | Leu | Thr | Glu | |
| | | | | 245 | | | | | 250 | | | | | 255 | | |
| gcg | ggc | cgt | acc | gcc | gtt | gat | caa | gtg | cgc | gag | ctc | ggc | gca | ccg | gag | 816 |
| Ala | Gly | Arg | Thr | Ala | Val | Asp | Gln | Val | Arg | Glu | Leu | Gly | Ala | Pro | Glu | |
| | | | 260 | | | | | 265 | | | | | 270 | | | |
| ctc | gtc | acc | cgc | ttc | ctc | ggc | cgc | gag | ctg | agc | gac | ttc | ctc | gac | act | 864 |
| Leu | Val | Thr | Arg | Phe | Leu | Gly | Arg | Glu | Leu | Ser | Asp | Phe | Leu | Asp | Thr | |
| | | 275 | | | | 280 | | | | | | 285 | | | | |
| tcc | ggc | ctt | ttc | gag | caa | cct | cga | tgg | cgc | gca | cga | ctg | gcc | gaa | agc | 912 |
| Ser | Gly | Leu | Phe | Glu | Gln | Pro | Arg | Trp | Arg | Ala | Arg | Leu | Ala | Glu | Ser | |
| | 290 | | | | | 295 | | | | | 300 | | | | | |

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| | |
|---|------|
| gtc gca ggt agg aac ggt ggc ccg gtg gtc ccc acg ctc gtc tac cac | 960 |
| Val Ala Gly Arg Asn Gly Gly Pro Val Val Pro Thr Leu Val Tyr His | |
| 305 310 315 320 | |
| agc acg gac gac gag atc gtt ccg ttc gca ttc ggc gag cga ctc cgg | 1008 |
| Ser Thr Asp Asp Glu Ile Val Pro Phe Ala Phe Gly Glu Arg Leu Arg | |
| 325 330 335 | |
| gac agc tac cgc gcg gcg ggt acg cca gtg cgg tgg cat ccg ctc tcc | 1056 |
| Asp Ser Tyr Arg Ala Ala Gly Thr Pro Val Arg Trp His Pro Leu Ser | |
| 340 345 350 | |
| gga ttg gct cac ttt ccc gcc gcc ctg gcc agc tcg cga gtg gtc gtc | 1104 |
| Gly Leu Ala His Phe Pro Ala Ala Leu Ala Ser Ser Arg Val Val Val | |
| 355 360 365 | |
| tcg tgg ttc gac gag cac ttc tcc gag ccg tcc gcg atc agc ggt ccg | 1152 |
| Ser Trp Phe Asp Glu His Phe Ser Glu Pro Ser Ala Ile Ser Gly Pro | |
| 370 375 380 | |
| cga gat gcc agg tga | 1167 |
| Arg Asp Ala Arg | |
| 385 | |

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 <212> PRT
 <213> Saccharopolyspora spinosa

<400> 22
 Met Ala Ser Glu His Ala Ser Leu Val Gly Asp Asp Leu Arg Ala Pro
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 Ala Asp Asp Pro Phe Tyr Arg Pro Pro Thr Pro Leu Pro Pro Gly Val
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 Pro Gly Thr Leu Leu Arg Ala Arg Pro Val Ser Ala Leu Arg Gly Thr
 35 40 45
 Gly Glu Pro Val Ala Ala Lys Ala Trp Gln Ile Leu Tyr Arg Ser Asn
 50 55 60
 Ser Ala Leu Gly Met Pro Asn Ala Val Ser Gly Thr Val Leu Val Pro
 65 70 75 80
 Asn Ile Pro Trp Pro Arg Glu Asp Arg Pro Ile Ile Thr Phe Ala Val
 85 90 95
 Gly Thr His Gly Leu Gly Ser Gln Val Ala Pro Ser Tyr Leu Leu Arg
 100 105 110
 Thr Gly Thr Glu Pro Glu Thr Glu Leu Ile Ala Val Ala Leu Asp Arg
 115 120 125
 Gly Trp Ala Val Val Ile Thr Asp Tyr Glu Gly Leu Gly Thr Pro Gly
 130 135 140
 Thr His Thr Tyr Thr Val Gly Arg Ala Gln Gly His Ala Met Leu Asp
 145 150 155 160
 Ala Ala Arg Ala Ala Gln Arg Leu Pro Gly Ser Gly Leu Thr Thr Asp
 165 170 175

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Cys Pro Val Gly Ile Trp Gly Tyr Ala Gln Gly Gly Gln Ala Ser Ala
180 185 190
Phe Ala Gly Glu Leu His Pro Thr Tyr Ala Pro Glu Leu Arg Ile Arg
195 200 205
Ala Ala Ala Ala Gly Ala Val Pro Ile Asp Leu Leu Asp Ile Ile His
210 215 220
Arg Asn Asp Gly Val Phe Thr Gly Pro Val Leu Ala Gly Leu Val Gly
225 230 235 240
His Ala Ala Ala Tyr Pro Asp Leu Pro Phe Asp Glu Leu Leu Thr Glu
245 250 255
Ala Gly Arg Thr Ala Val Asp Gln Val Arg Glu Leu Gly Ala Pro Glu
260 265 270
Leu Val Thr Arg Phe Leu Gly Arg Glu Leu Ser Asp Phe Leu Asp Thr
275 280 285
Ser Gly Leu Phe Glu Gln Pro Arg Trp Arg Ala Arg Leu Ala Glu Ser
290 295 300
Val Ala Gly Arg Asn Gly Gly Pro Val Val Pro Thr Leu Val Tyr His
305 310 315 320
Ser Thr Asp Asp Glu Ile Val Pro Phe Ala Phe Gly Glu Arg Leu Arg
325 330 335
Asp Ser Tyr Arg Ala Ala Gly Thr Pro Val Arg Trp His Pro Leu Ser
340 345 350
Gly Leu Ala His Phe Pro Ala Ala Leu Ala Ser Ser Arg Val Val Val
355 360 365
Ser Trp Phe Asp Glu His Phe Ser Glu Pro Ser Ala Ile Ser Gly Pro
370 375 380
Arg Asp Ala Arg
385

<210> 23
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<212> DNA
<213> Saccharopolyspora spinosa

<220>
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<222> (1)..(1008)
<223> ORF9; 2,3-reductase

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Met Thr Ser Ser Met Arg Lys Pro Val Arg Ile Gly Val Leu Gly Cys
1 5 10 15
gct tcc ttc gcg tgg cga cgg atg ctg ccc gcg atg tgc gac gtg gcc 96
Ala Ser Phe Ala Trp Arg Arg Met Leu Pro Ala Met Cys Asp Val Ala
20 25 30

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| | | | | | | | | | | | | | | | | |
|-------------------|------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-----|
| gaa Glu | aca Thr | gag Glu 35 | gtg Val | gtg Val | gcg Ala | gtg Val | gcg Ala 40 | agc Ser | cgt Arg | gat Asp | ccg Pro | gcg Ala 45 | aaa Lys | gcc Ala | gaa Glu | 144 |
| cgg Arg | ttc Phe 50 | gca Ala | gcg Ala | cga Arg | ttc Phe | gaa Glu 55 | tgc Cys | gag Glu | gcg Ala | gtg Val | ctg Leu 60 | ggt Gly | tac Tyr | cag Gln | cgg Arg | 192 |
| ctc Leu 65 | ctg Leu | gag Glu | cgg Arg | ccg Pro | gac Asp 70 | atc Ile | gat Asp | gcc Ala | gtc Val | tac Tyr 75 | gtg Val | ccg Pro | ttg Leu | ccg Pro | cct Pro 80 | 240 |
| ggc Gly | atg Met | cat His | gca Ala | gag Glu 85 | tgg Trp | atc Ile | ggc Gly | aag Lys | gcg Ala 90 | ctt Leu | gag Glu | gca Ala | gac Asp | aaa Lys 95 | cac His | 288 |
| gtg Val | ctt Leu | gcg Ala | gag Glu 100 | aaa Lys | ccg Pro | ctg Leu | acg Thr 105 | acg Thr | acg Thr | gcg Ala | tcc Ser | gac Asp 110 | acc Thr | gct Ala | cgc Arg | 336 |
| ctg Leu | gtc Val | ggg Gly 115 | ctg Leu | gcc Ala | agg Arg | agg Arg | aag Lys 120 | aac Asn | ctg Leu | ctg Leu | ctg Leu | cgg Arg 125 | gag Glu | aat Asn | tac Tyr | 384 |
| ctg Leu 130 | ttc Phe | ctc Leu | cac His | cac His | ggc Gly | cgg Arg 135 | cac His | gac Asp | gtg Val | gtc Val | cgc Arg 140 | gac Asp | ctg Leu | ctg Leu | caa Gln | 432 |
| tcc Ser 145 | ggg Gly | gag Glu | atc Ile | ggt Gly | gag Glu 150 | ctc Leu | cgg Arg | gag Glu | ttc Phe 155 | acc Thr 155 | gcc Ala | gtg Val | ttc Phe | gga Gly | att Ile 160 | 480 |
| ccg Pro | ccg Pro | ctt Leu | ccc Pro | gac Asp 165 | acg Thr | gac Asp | atc Ile | cgc Arg | tat Tyr 170 | cgc Arg | acc Thr | gaa Glu | ctc Leu | ggt Gly 175 | ggc Gly | 528 |
| gga Gly | gcg Ala | ttg Leu | ctg Leu 180 | gac Asp | atc Ile | ggt Gly | gtc Val | tat Tyr 185 | ccc Pro | gcc Ala | cgt Arg | gcc Ala | gct Ala 190 | cgg Arg | cac His | 576 |
| ttt Phe | ctc Leu | ctc Leu 195 | ggt Gly | ccg Pro | ctc Leu | acg Thr | gtt Val 200 | ctc Leu | ggc Gly | gca Ala | agc Ser 205 | tcg Ser | cac His | gag Glu | gcc Ala | 624 |
| cag Gln 210 | gag Glu | tcg Ser | ggc Gly | gtc Val | gac Asp | ttg Leu 215 | tcg Ser | ggc Gly | agc Ser | gtg Val | ctg Leu 220 | ctc Leu | caa Gln | tcg Ser | gaa Glu | 672 |
| ggt Gly 225 | ggc Gly | acc Thr | gtt Val | gcc Ala | cac His 230 | ctc Leu | gga Gly | tac Tyr | ggt Gly | ttc Phe 235 | gtg Val | cac His | cac His | tac Tyr | cgc Arg 240 | 720 |
| agc Ser | gcg Ala | tac Tyr | gag Glu | ctg Leu 245 | tgg Trp | ggg Gly | agt Ser | cgt Arg | ggg Gly 250 | cga Arg | atc Ile | gtc Val | gtc Val | gac Asp 255 | cgg Arg | 768 |
| gcg Ala | ttc Phe | acg Thr | ccg Pro 260 | ccc Pro | gcc Ala | gag Glu | tgg Trp | cag Gln 265 | gcc Ala | gtg Val | atc Ile | cga Arg | atc Ile 270 | gag Glu | cgg Arg | 816 |
| aag Lys | ggc Gly | gtt Val | gtc Val | gac Asp | gag Glu | ttg Leu | tcc Ser | ttg Leu | cca Pro | gcg Ala | gaa Glu | gat Asp | cag Gln | gtt Val | cgc Arg | 864 |

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| 275 | 280 | 285 | |
|--|-----|-----|------|
| aag gcg gtc acc gcc ttc gca cgc gac atc aga gca ggg aca ggc gtg Lys Ala Val Thr Ala Phe Ala Arg Asp Ile Arg Ala Gly Thr Gly Val | | | 912 |
| 290 | 295 | 300 | |
| gac gac cct gcg gtg gcc gga gat tcg ggc gaa tcg atg atc cag cag Asp Asp Pro Ala Val Ala Gly Asp Ser Gly Glu Ser Met Ile Gln Gln | | | 960 |
| 305 | 310 | 315 | 320 |
| gcc gcg ctg gtg gag gcg atc ggt cag gcc cgt cgg tgc ggg tcc aca Ala Ala Leu Val Glu Ala Ile Gly Gln Ala Arg Arg Cys Gly Ser Thr | | | 1008 |
| | 325 | 330 | 335 |
| tag | | | 1011 |

<210> 24

<211> 336

<212> PRT

<213> Saccharopolyspora spinosa

<400> 24

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| Ala Ser Phe Ala Trp Arg Arg Met Leu Pro Ala Met Cys Asp Val Ala 20 25 30 |
| Glu Thr Glu Val Val Ala Val Ala Ser Arg Asp Pro Ala Lys Ala Glu 35 40 45 |
| Arg Phe Ala Ala Arg Phe Glu Cys Glu Ala Val Leu Gly Tyr Gln Arg 50 55 60 |
| Leu Leu Glu Arg Pro Asp Ile Asp Ala Val Tyr Val Pro Leu Pro Pro 65 70 75 80 |
| Gly Met His Ala Glu Trp Ile Gly Lys Ala Leu Glu Ala Asp Lys His 85 90 95 |
| Val Leu Ala Glu Lys Pro Leu Thr Thr Thr Ala Ser Asp Thr Ala Arg 100 105 110 |
| Leu Val Gly Leu Ala Arg Arg Lys Asn Leu Leu Leu Arg Glu Asn Tyr 115 120 125 |
| Leu Phe Leu His His Gly Arg His Asp Val Val Arg Asp Leu Leu Gln 130 135 140 |
| Ser Gly Glu Ile Gly Glu Leu Arg Glu Phe Thr Ala Val Phe Gly Ile 145 150 155 160 |
| Pro Pro Leu Pro Asp Thr Asp Ile Arg Tyr Arg Thr Glu Leu Gly Gly 165 170 175 |
| Gly Ala Leu Leu Asp Ile Gly Val Tyr Pro Ala Arg Ala Ala Arg His 180 185 190 |
| Phe Leu Leu Gly Pro Leu Thr Val Leu Gly Ala Ser Ser His Glu Ala 195 200 205 |
| Gln Glu Ser Gly Val Asp Leu Ser Gly Ser Val Leu Leu Gln Ser Glu |

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| | | | |
|-------------------------|---|---|--|
| 210 | 215 | 220 | |
| Gly 225 | Gly Thr Val Ala His 230 | Leu Gly Tyr Gly Phe Val His His Tyr Arg 240 | |
| Ser Ala Tyr Glu 245 | Leu Trp Gly Ser Arg 250 | Gly Arg Ile Val Val Asp Arg 255 | |
| Ala Phe Thr 260 | Pro Ala Glu Trp Gln 265 | Ala Val Ile Arg Ile Glu Arg 270 | |
| Lys Gly Val 275 | Val Asp Glu Leu Ser 280 | Leu Pro Ala Glu Asp Gln Val Arg 285 | |
| Lys Ala Val 290 | Thr Ala Phe Ala Arg Asp Ile Arg 300 | Ala Gly Thr Gly Val 305 | |
| Asp Asp Pro Ala Val 310 | Ala Gly Asp Ser Gly Glu 315 | Ser Met Ile Gln Gln 320 | |
| Ala Ala Leu Val 325 | Glu Ala Ile Gly Gln Ala Arg Arg Cys Gly 335 | Ser Thr 340 | |

<210> 25
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 <212> DNA
 <213> Saccharopolyspora spinosa

<220>
 <221> CDS
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 <223> ORF10; 2,3-dehydratase

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| Met Ser Ser Ser Val 5 | Glu Ala Glu Ala Ser Ala Ala Pro Leu Gly 15 |
| 1 | |
| agc aac aac acg cgg cgg ttc gtc gac tct gcg ctg agc gct tgc aat 96 | |
| Ser Asn Asn Thr 20 | Arg Arg Phe Val Asp Ser Ala Leu Ser Ala Cys Asn 30 |
| 20 | |
| ggc atg att ccg acc acg gag ttc cac tgc tgg ctc gcc gat cgg ctg 144 | |
| Gly Met Ile Pro Thr Thr Glu Phe His Cys Trp Leu Ala Asp Arg Leu 45 | |
| 35 | |
| ggc gag aac agc ttc gag acc aat cgc atc ccg ttc gac cgc ctg tcg 192 | |
| Gly Glu Asn Ser Phe Glu Thr Asn Arg Ile Pro Phe Asp Arg Leu Ser 60 | |
| 50 | |
| aaa tgg aaa ttc gat gcc agc acg gag aac ctg gtt cat gcc gac ggt 240 | |
| Lys Trp Lys Phe Asp Ala Ser Thr Glu Asn Leu Val His Ala Asp Gly 80 | |
| 65 | |
| agg ttc ttc acg gta gaa ggc ctg cag gtc gag acc aac tat ggc gcg 288 | |
| Arg Phe Phe Thr Val 85 | Glu Gly Leu Gln Val Glu Thr Asn Tyr Gly Ala 95 |
| 85 | |
| gca ccc agc tgg cac cag ccg atc atc aac cag gct gaa gta ggt atc 336 | |
| Ala Pro Ser Trp 100 | His Gln Pro Ile Ile Asn Gln Ala Glu Val Gly Ile 110 |
| 100 | |

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| | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|
| ctc | ggc | att | ctc | gtc | aag | gag | atc | gac | ggc | gtg | ctg | cac | tgc | ctc | atg | 384 |
| Leu | Gly | Ile | Leu | Val | Lys | Glu | Ile | Asp | Gly | Val | Leu | His | Cys | Leu | Met | |
| | | 115 | | | | | 120 | | | | | 125 | | | | |
| tca | gca | aag | atg | gaa | ccg | ggc | aac | gtc | aac | gtc | ctg | cag | ctc | tcg | ccg | 432 |
| Ser | Ala | Lys | Met | Glu | Pro | Gly | Asn | Val | Asn | Val | Leu | Gln | Leu | Ser | Pro | |
| | 130 | | | | | 135 | | | | | 140 | | | | | |
| acg | gtt | cag | gca | act | cgg | agc | aac | tac | acg | cag | gca | cac | cgt | ggc | agc | 480 |
| Thr | Val | Gln | Ala | Thr | Arg | Ser | Asn | Tyr | Thr | Gln | Ala | His | Arg | Gly | Ser | |
| 145 | | | | | 150 | | | | | 155 | | | | | 160 | |
| gtt | ccg | ccc | tat | gtg | gac | tac | ttc | ctc | ggg | cgg | ggc | cgc | ggc | cgc | gtg | 528 |
| Val | Pro | Pro | Tyr | Val | Asp | Tyr | Phe | Leu | Gly | Arg | Gly | Arg | Gly | Arg | Val | |
| | | | | 165 | | | | | 170 | | | | | 175 | | |
| ctg | gta | gac | gtg | ctc | cag | tct | gaa | cag | ggg | tcc | tgg | ttc | tac | cgg | aag | 576 |
| Leu | Val | Asp | Val | Leu | Gln | Ser | Glu | Gln | Gly | Ser | Trp | Phe | Tyr | Arg | Lys | |
| | | | 180 | | | | | 185 | | | | | 190 | | | |
| cgc | aac | cgg | aac | atg | gtg | gtg | gaa | gtc | cag | gag | gaa | gtg | cca | gtc | ctg | 624 |
| Arg | Asn | Arg | Asn | Met | Val | Val | Glu | Val | Gln | Glu | Glu | Val | Pro | Val | Leu | |
| | | 195 | | | | | 200 | | | | | 205 | | | | |
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| Pro | Phe | His | Asp | Ser | Ala | Thr | Gly | Pro | Glu | Leu | Ala | Ala | Ser | Glu | Glu | |
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| Ser | Ser | Ile | Ser | Glu | Ala | Val | Gly | Trp | Phe | Glu | Glu | Ala | Lys | Ala | Arg | |
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| Tyr | Arg | Leu | Arg | Ala | Thr | Arg | Val | Pro | Leu | Ser | Arg | Val | Asp | Lys | Trp | |
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| Thr | Gln | Pro | Met | Ile | Glu | Pro | Arg | Glu | Gln | Gly | Glu | Ile | Ala | Leu | Leu | |
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| Val | Lys | Arg | Ile | Gly | Gly | Val | Leu | His | Gly | Leu | Val | His | Ala | Arg | Val | |

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| Glu | Ala | Gly | Tyr | Lys | Trp | Thr | Ala | Glu | Ile | Ala | Pro | Thr | Val | Gln | Cys | |
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| Ser | Val | Ala | Asn | Tyr | Gln | Ser | Thr | Pro | Ser | Asn | Asp | Trp | Pro | Pro | Phe | |
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| Leu | Asp | Asp | Val | Leu | Thr | Ala | Asp | Pro | Glu | Thr | Val | Arg | Tyr | Glu | Ser | |
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| Ile | Leu | Ser | Glu | Glu | Gly | Gly | Arg | Phe | Tyr | Gln | Ala | Gln | Asn | Arg | Tyr | |
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| cgg | atc | atc | gag | gtg | cat | gag | gac | ttc | gcg | gca | cga | cct | ccc | agc | gac | 1344 |
| Arg | Ile | Ile | Glu | Val | His | Glu | Asp | Phe | Ala | Ala | Arg | Pro | Pro | Ser | Asp | |
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| ttc | cgg | tgg | atg | act | ttg | gga | cag | ttg | ggc | gag | ctg | ctc | cgg | agc | acc | 1392 |
| Phe | Arg | Trp | Met | Thr | Leu | Gly | Gln | Leu | Gly | Glu | Leu | Leu | Arg | Ser | Thr | |
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| His | Phe | Leu | Asn | Ile | Gln | Ala | Arg | Ser | Leu | Val | Ala | Ser | Leu | His | Ser | |
| 465 | | | | | 470 | | | | | 475 | | | | | 480 | |
| ttg | tgg | gcg | ttg | ggg | cga | tga | | | | | | | | | | 1461 |
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| | | | | | | | | | | | | | | | |
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| | | | | | | | | | | | | | | | |
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| Gly | Met | Ile | Pro | Thr | Thr | Glu | Phe | His | Cys | Trp | Leu | Ala | Asp | Arg | Leu |
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| Gly | Glu | Asn | Ser | Phe | Glu | Thr | Asn | Arg | Ile | Pro | Phe | Asp | Arg | Leu | Ser |
| | 50 | | | | | 55 | | | | | 60 | | | | |

| | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Lys | Trp | Lys | Phe | Asp | Ala | Ser | Thr | Glu | Asn | Leu | Val | His | Ala | Asp | Gly |
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| | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Arg | Phe | Phe | Thr | Val | Glu | Gly | Leu | Gln | Val | Glu | Thr | Asn | Tyr | Gly | Ala |
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| | | | | | | | | | | | | | | | |
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| Ala | Pro | Ser | Trp | His | Gln | Pro | Ile | Ile | Asn | Gln | Ala | Glu | Val | Gly | Ile |
| | | | 100 | | | | | 105 | | | | | 110 | | |

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| Leu | Gly | Ile | Leu | Val | Lys | Glu | Ile | Asp | Gly | Val | Leu | His | Cys | Leu | Met |
| | | | | | | | | | | | | | | | |

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| Ser | Ala | Lys | Met | Glu | Pro | Gly | Asn | Val | Asn | Val | Leu | Gln | Leu | Ser | Pro |
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| Thr | Val | Gln | Ala | Thr | Arg | Ser | Asn | Tyr | Thr | Gln | Ala | His | Arg | Gly | Ser |
| 145 | | | | | 150 | | | | | 155 | | | | | 160 |
| Val | Pro | Pro | Tyr | Val | Asp | Tyr | Phe | Leu | Gly | Arg | Gly | Arg | Gly | Arg | Val |
| | | | | 165 | | | | | 170 | | | | | 175 | |
| Leu | Val | Asp | Val | Leu | Gln | Ser | Glu | Gln | Gly | Ser | Trp | Phe | Tyr | Arg | Lys |
| | | | 180 | | | | | 185 | | | | | 190 | | |
| Arg | Asn | Arg | Asn | Met | Val | Val | Glu | Val | Gln | Glu | Glu | Val | Pro | Val | Leu |
| | | 195 | | | | | 200 | | | | | 205 | | | |
| Pro | Asp | Phe | Cys | Trp | Leu | Thr | Leu | Gly | Gln | Val | Leu | Ala | Leu | Leu | Arg |
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| Pro | Phe | His | Asp | Ser | Ala | Thr | Gly | Pro | Glu | Leu | Ala | Ala | Ser | Glu | Glu |
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| Ser | Ser | Ile | Ser | Glu | Ala | Val | Gly | Trp | Phe | Glu | Glu | Ala | Lys | Ala | Arg |
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| Tyr | Arg | Leu | Arg | Ala | Thr | Arg | Val | Pro | Leu | Ser | Arg | Val | Asp | Lys | Trp |
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| Tyr | Arg | Thr | Asp | Thr | Glu | Ile | Ala | His | Gln | Asp | Gly | Lys | Tyr | Phe | Ala |
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| Val | Ile | Ala | Val | Ser | Val | Ser | Ala | Thr | Asn | Arg | Glu | Val | Ala | Ser | Trp |
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| Thr | Gln | Pro | Met | Ile | Glu | Pro | Arg | Glu | Gln | Gly | Glu | Ile | Ala | Leu | Leu |
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| Val | Lys | Arg | Ile | Gly | Gly | Val | Leu | His | Gly | Leu | Val | His | Ala | Arg | Val |
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| Ser | Val | Ala | Asn | Tyr | Gln | Ser | Thr | Pro | Ser | Asn | Asp | Trp | Pro | Pro | Phe |
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| Leu | Asp | Asp | Val | Leu | Thr | Ala | Asp | Pro | Glu | Thr | Val | Arg | Tyr | Glu | Ser |
| | | | | 405 | | | | | 410 | | | | | 415 | |
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450 455 460

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Leu Trp Ala Leu Gly Arg
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 Trp Arg Pro Leu Ser Asn Asp Tyr Arg Ala Val Glu Thr Tyr Arg Cys
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 Ala Glu Pro Lys Val Thr Leu Asp Glu Ala Glu Ala Trp Arg Glu His
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| | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|--|
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| Asp | Thr | Asp | Ala | Val | Glu | Gln | Leu | His | Leu | Val | Asp | Asp | Arg | Ser | Leu | | |
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| Trp | Asp | Ala | Met | Val | Cys | Ser | Gly | Pro | Val | Val | Ala | Arg | Ala | Leu | Gly | | |
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| Val | Asp | Pro | Leu | Gly | Thr | Trp | Leu | Gly | Ala | Lys | Leu | Ala | Lys | Phe | Gly | | |
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| Glu | Arg | Pro | Thr | Lys | Pro | Arg | Val | Cys | Ile | Thr | Arg | Gly | Leu | Thr | Lys | | |
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| Arg | Arg | Leu | Ser | Arg | Val | Thr | Glu | Gln | Tyr | Gly | Glu | Gln | Ser | Asp | Gln | | |
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| Glu | Gln | Ala | Met | Val | Glu | Arg | Leu | Leu | Arg | Gly | Ala | Ala | Arg | Leu | Asp | | |
| | | 275 | | | | | 280 | | | | | 285 | | | | | |
| gtc | gag | gtg | atc | gcc | acc | ttg | tct | gac | gac | gaa | gta | cgg | gag | atg | ggg | 912 | |
| Val | Glu | Val | Ile | Ala | Thr | Leu | Ser | Asp | Asp | Glu | Val | Arg | Glu | Met | Gly | | |
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LeA33955-US

| | | | | | | | | | | | | | | | | |
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| Glu | Leu | Pro | Ser | Asn | Val | Arg | Val | His | Glu | Tyr | Val | Pro | Leu | Asn | Glu | |
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| ctg | ctg | gag | tcg | tgt | tca | gtg | atc | atc | cat | cat | ggc | tcg | acg | acg | acg | 1008 |
| Leu | Leu | Glu | Ser | Cys | Ser | Val | Ile | Ile | His | His | Gly | Ser | Thr | Thr | Thr | |
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| Gln | Glu | Thr | Ala | Thr | Val | Asn | Gly | Val | Pro | Gln | Leu | Ile | Leu | Pro | Gly | |
| | | | 340 | | | | | 345 | | | | | 350 | | | |
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| Thr | Phe | Trp | Asp | Glu | Ser | Arg | Arg | Ala | Glu | Leu | Leu | Ala | Asp | Arg | Gly | |
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| gcc | ggt | ctg | gtc | ctc | gac | ccc | gcg | acg | ttt | acc | gaa | gac | gac | gtg | cga | 1152 |
| Ala | Gly | Leu | Val | Leu | Asp | Pro | Ala | Thr | Phe | Thr | Glu | Asp | Asp | Val | Arg | |
| | 370 | | | | | 375 | | | | | 380 | | | | | |
| ggt | cag | ctg | gcc | cgc | ctg | ctc | gac | gag | ccg | tcg | ttc | gct | gcc | aac | gcg | 1200 |
| Gly | Gln | Leu | Ala | Arg | Leu | Leu | Asp | Glu | Pro | Ser | Phe | Ala | Ala | Asn | Ala | |
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| Ala | Leu | Ile | Arg | Arg | Glu | Ile | Glu | Glu | Ser | Pro | Ser | Pro | His | Asp | Ile | |
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| gtt | cca | cgt | ctg | gaa | aag | cta | gtt | gcc | gaa | cgt | gag | aac | cgc | cgc | act | 1296 |
| Val | Pro | Arg | Leu | Glu | Lys | Leu | Val | Ala | Glu | Arg | Glu | Asn | Arg | Arg | Thr | |
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| ggg | cag | tct | gat | ggc | cat | ccg | tga | | | | | | | | | 1320 |
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 Val Ala Ile Cys Pro Asn Met Val Ser Met Val Thr Gly Ala Gly Leu
 35 40 45
 Thr Ala Val Pro Val Gly Asp Glu Leu Asp Leu Ile Ser Leu Ala Ala
 50 55 60
 Lys Asn Glu Leu Val Leu Gly Ser Gly Val Ser Phe Asp Glu Lys Gly
 65 70 75 80
 Arg His Pro Glu Leu Phe Asp Glu Leu Leu Ser Ile Asn Ser Gly Arg
 85 90 95
 Asp Thr Asp Ala Val Glu Gln Leu His Leu Val Asp Asp Arg Ser Leu
 100 105 110

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 115 120 125
 Trp Asp Ala Met Val Cys Ser Gly Pro Val Val Ala Arg Ala Leu Gly
 130 135 140
 Ala Arg His Val Arg Met Leu Val Ala Leu Asp Val Ser Gly Trp Leu
 145 150 155 160
 Arg Ser Gly Phe Leu Glu Tyr Gln Glu Ser Lys Pro Pro Glu Gln Arg
 165 170 175
 Val Asp Pro Leu Gly Thr Trp Leu Gly Ala Lys Leu Ala Lys Phe Gly
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 Ala Thr Phe Asp Glu Glu Ile Val Thr Gly Gln Ala Thr Ile Asp Pro
 195 200 205
 Ile Pro Ser Trp Met Arg Leu Pro Val Asp Leu Asp Tyr Ile Ser Met
 210 215 220
 Arg Phe Val Pro Tyr Asn Gly Pro Ala Val Leu Pro Glu Trp Leu Arg
 225 230 235 240
 Glu Arg Pro Thr Lys Pro Arg Val Cys Ile Thr Arg Gly Leu Thr Lys
 245 250 255
 Arg Arg Leu Ser Arg Val Thr Glu Gln Tyr Gly Glu Gln Ser Asp Gln
 260 265 270
 Glu Gln Ala Met Val Glu Arg Leu Leu Arg Gly Ala Ala Arg Leu Asp
 275 280 285
 Val Glu Val Ile Ala Thr Leu Ser Asp Asp Glu Val Arg Glu Met Gly
 290 295 300
 Glu Leu Pro Ser Asn Val Arg Val His Glu Tyr Val Pro Leu Asn Glu
 305 310 315 320
 Leu Leu Glu Ser Cys Ser Val Ile Ile His His Gly Ser Thr Thr Thr
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 Gln Glu Thr Ala Thr Val Asn Gly Val Pro Gln Leu Ile Leu Pro Gly
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 Thr Phe Trp Asp Glu Ser Arg Arg Ala Glu Leu Leu Ala Asp Arg Gly
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 Ala Gly Leu Val Leu Asp Pro Ala Thr Phe Thr Glu Asp Asp Val Arg
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 Gly Gln Leu Ala Arg Leu Leu Asp Glu Pro Ser Phe Ala Ala Asn Ala
 385 390 395 400
 Ala Leu Ile Arg Arg Glu Ile Glu Glu Ser Pro Ser Pro His Asp Ile
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 35 40 45
 gaa tcc ccg acc ttc gtg gct gga tcg acg ccg atc cgg cca tcg ggc 192
 Glu Ser Pro Thr Phe Val Ala Gly Ser Thr Pro Ile Arg Pro Ser Gly
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 gcc gtg ctc gac gag gac gac cgg gtg gca ctg gtg gaa gcc gcg ctg 240
 Ala Val Leu Asp Glu Asp Asp Arg Val Ala Leu Val Glu Ala Ala Leu
 65 70 75 80
 gag ctc cgg atc gcc gcg ggc ggg aat gca cgg cga ttc gag agc gag 288
 Glu Leu Arg Ile Ala Ala Gly Gly Asn Ala Arg Arg Phe Glu Ser Glu
 85 90 95
 ttc gcc cgc ttc ttc ggc ctc cgc aag gct cat ctc gtc aac tcc ggt 336
 Phe Ala Arg Phe Phe Gly Leu Arg Lys Ala His Leu Val Asn Ser Gly
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 Ser Ser Ala Asn Leu Leu Ala Leu Ser Ser Leu Thr Ser Pro Lys Leu
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 Gly Glu Ala Arg Leu Arg Pro Gly Asp Glu Val Ile Thr Ala Ala Val
 130 135 140
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 Gly Phe Pro Thr Thr Ile Asn Pro Ala Val Gln Asn Gly Leu Val Pro
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 165 170 175
 atc aag gcc gcc gtc acg gaa cgg acg cga gcc atc atg ctg gcg cac 576
 Ile Lys Ala Ala Val Thr Glu Arg Thr Arg Ala Ile Met Leu Ala His
 180 185 190
 acc ctg ggc aac ccc ttc gcc gct gac gaa atc gcg gag atc gca aaa 624

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| Thr | Leu | Gly 195 | Asn | Pro | Phe | Ala | Ala 200 | Asp | Glu | Ile | Ala | Glu 205 | Ile | Ala | Lys |
| gaa Glu | cac His 210 | gag Glu | ctg Leu | ttc Phe | ctc Leu | gtc Val 215 | gaa Glu | gac Asp | aac Asn | tgt Cys | gat Asp 220 | gcg Ala | gtg Val | gga Gly | tcc Ser |
| acc Thr 225 | tac Tyr | cgg Arg | gga Gly | cgg Arg | ctg Leu 230 | acc Thr | gga Gly | acc Thr | ttc Phe | ggc Gly 235 | gac Asp | ctg Leu | aca Thr | acg Thr | gtc Val 240 |
| agc Ser | ttc Phe | tat Tyr | cct Pro | gcc Ala 245 | cat His | cac His | atc Ile | acc Thr | agc Ser 250 | ggc Gly | gag Glu | ggt Gly | ggc Gly | tgc Cys 255 | gtg Val |
| ttg Leu | acc Thr | ggc Gly | agc Ser 260 | ctg Leu | gaa Glu | ttg Leu | gct Ala | cgc Arg 265 | atc Ile | atc Ile | gag Glu | tcg Ser | ctg Leu 270 | cgt Arg | gac Asp |
| tgg Trp | gga Gly | cgg Arg 275 | gat Asp | tgc Cys | tgg Trp | tgc Cys | gag Glu 280 | ccc Pro | ggc Gly | gtg Val | gac Asp | aac Asn 285 | acc Thr | tgc Cys | cgc Arg |
| aag Lys | agg Arg 290 | ttc Phe | gac Asp | tac Tyr | cac His | ctc Leu 295 | ggt Gly | acc Thr | ctt Leu | cca Pro | ccg Pro 300 | ggc Gly | tac Tyr | gac Asp | cac His |
| aag Lys 305 | tac Tyr | acg Thr | ttc Phe | tcc Ser | cac His 310 | gtc Val | ggt Gly | tac Tyr | aac Asn | ctc Leu 315 | aag Lys | acc Thr | acc Thr | gac Asp | ctg Leu 320 |
| cag Gln | gcc Ala | gca Ala | ctt Leu | gcg Ala 325 | ctg Leu | agc Ser | cag Gln | ttg Leu | agc Ser 330 | aag Lys | att Ile | tcc Ser | gca Ala | ttc Phe 335 | ggg Gly |
| tcg Ser | gca Ala | cgc Arg | cgc Arg 340 | cgt Arg | aac Asn | tgg Trp | cga Arg | cgg Arg 345 | ttg Leu | cgc Arg | gaa Glu | ggg Gly 350 | ctg Leu | tcc Ser | ggg Gly |
| ttg Leu | ccg Pro | ggc Gly 355 | ctg Leu | ctg Leu | ctg Leu | ccg Pro | gta Val 360 | gcc Ala | aca Thr | ccg Pro | cac His | agc Ser 365 | gac Asp | ccg Pro | agc Ser |
| tgg Trp | ttc Phe 370 | ggg Gly | ttt Phe | gcg Ala | atc Ile | acc Thr 375 | atc Ile | agt Ser | gcg Ala | gac Asp | gcc Ala 380 | ggg Gly | ttc Phe | acc Thr | cgt Arg |
| gcc Ala 385 | gcc Ala | ctg Leu | gtg Val | aac Asn | ttc Phe 390 | ctg Leu | gaa Glu | tcc Ser | cgc Arg | aac Asn 395 | atc Ile | ggc Gly | acc Thr | cga Arg | ctg Leu 400 |
| ctg Leu | ttc Phe | ggc Gly | ggt Gly | aac Asn 405 | atc Ile | acc Thr | cgg Arg | cac His | ccg Pro 410 | gcc Ala | ttc Phe | gag Glu | cag Gln | gtg Val 415 | cgg Arg |
| tac Tyr | cgg Arg | atc Ile 420 | gcc Ala | gac Asp | gcg Ala | ctc Leu | acc Thr | aac Asn 425 | agc Ser | gac Asp | atc Ile | gtc Val 430 | acc Thr | gac Asp | cga Arg |
| acc Thr | ttc Phe | tgg Trp 435 | gtc Val | ggc Gly | gtc Val | tac Tyr | cca Pro 440 | ggc Gly | ata Ile | acg Thr | gac Asp | caa Gln 445 | atg Met | atc Ile | gac Asp |

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1389

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 Ala Val Leu Asp Glu Asp Arg Val Ala Leu Val Glu Ala Ala Leu
 65 70 75 80
 Glu Leu Arg Ile Ala Ala Gly Gly Asn Ala Arg Arg Phe Glu Ser Glu
 85 90 95
 Phe Ala Arg Phe Phe Gly Leu Arg Lys Ala His Leu Val Asn Ser Gly
 100 105 110
 Ser Ser Ala Asn Leu Leu Ala Leu Ser Ser Leu Thr Ser Pro Lys Leu
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 Gly Glu Ala Arg Leu Arg Pro Gly Asp Glu Val Ile Thr Ala Ala Val
 130 135 140
 Gly Phe Pro Thr Thr Ile Asn Pro Ala Val Gln Asn Gly Leu Val Pro
 145 150 155 160
 Val Phe Val Asp Val Glu Leu Gly Thr Tyr Asn Ala Thr Pro Asp Arg
 165 170 175
 Ile Lys Ala Ala Val Thr Glu Arg Thr Arg Ala Ile Met Leu Ala His
 180 185 190
 Thr Leu Gly Asn Pro Phe Ala Ala Asp Glu Ile Ala Glu Ile Ala Lys
 195 200 205
 Glu His Glu Leu Phe Leu Val Glu Asp Asn Cys Asp Ala Val Gly Ser
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 Thr Tyr Arg Gly Arg Leu Thr Gly Thr Phe Gly Asp Leu Thr Thr Val
 225 230 235 240
 Ser Phe Tyr Pro Ala His His Ile Thr Ser Gly Glu Gly Gly Cys Val
 245 250 255
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 260 265 270
 Trp Gly Arg Asp Cys Trp Cys Glu Pro Gly Val Asp Asn Thr Cys Arg
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| | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 275 | | 280 | | 285 | | | | | | | | | | | |
| Lys | Arg | Phe | Asp | Tyr | His | Leu | Gly | Thr | Leu | Pro | Pro | Gly | Tyr | Asp | His |
| | 290 | | | | | 295 | | | | | 300 | | | | |
| Lys | Tyr | Thr | Phe | Ser | His | Val | Gly | Tyr | Asn | Leu | Lys | Thr | Thr | Asp | Leu |
| 305 | | | | | 310 | | | | | 315 | | | | | 320 |
| Gln | Ala | Ala | Leu | Ala | Leu | Ser | Gln | Leu | Ser | Lys | Ile | Ser | Ala | Phe | Gly |
| | | | | 325 | | | | | 330 | | | | | 335 | |
| Ser | Ala | Arg | Arg | Arg | Asn | Trp | Arg | Arg | Leu | Arg | Glu | Gly | Leu | Ser | Gly |
| | | | 340 | | | | | 345 | | | | | 350 | | |
| Leu | Pro | Gly | Leu | Leu | Leu | Pro | Val | Ala | Thr | Pro | His | Ser | Asp | Pro | Ser |
| | | 355 | | | | | 360 | | | | | 365 | | | |
| Trp | Phe | Gly | Phe | Ala | Ile | Thr | Ile | Ser | Ala | Asp | Ala | Gly | Phe | Thr | Arg |
| | 370 | | | | | 375 | | | | | 380 | | | | |
| Ala | Ala | Leu | Val | Asn | Phe | Leu | Glu | Ser | Arg | Asn | Ile | Gly | Thr | Arg | Leu |
| 385 | | | | | 390 | | | | | 395 | | | | | 400 |
| Leu | Phe | Gly | Gly | Asn | Ile | Thr | Arg | His | Pro | Ala | Phe | Glu | Gln | Val | Arg |
| | | | | 405 | | | | | 410 | | | | | 415 | |
| Tyr | Arg | Ile | Ala | Asp | Ala | Leu | Thr | Asn | Ser | Asp | Ile | Val | Thr | Asp | Arg |
| | | | 420 | | | | | 425 | | | | | 430 | | |
| Thr | Phe | Trp | Val | Gly | Val | Tyr | Pro | Gly | Ile | Thr | Asp | Gln | Met | Ile | Asp |
| | 435 | | | | | 440 | | | | | 445 | | | | |
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| 1 5 10 15 | |
| atc gcg gag gtg ttc gcc tcc aac tgg atc ggg ctc ggg ccg cgc acc | 96 |
| Ile Ala Glu Val Phe Ala Ser Asn Trp Ile Gly Leu Gly Pro Arg Thr | |
| 20 25 30 | |
| cgg acg ttc gag gcc gaa ttc gcc cac cac ctg gga gtg gat ccc gaa | 144 |
| Arg Thr Phe Glu Ala Glu Phe Ala His His Leu Gly Val Asp Pro Glu | |
| 35 40 45 | |
| cag gtc gtg ttc ctc aac tcg ggg act gcc gcg ctg ttc ctt acc gtg | 192 |
| Gln Val Val Phe Leu Asn Ser Gly Thr Ala Ala Leu Phe Leu Thr Val | |
| 50 55 60 | |

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| | | | | | | | | | | | | | | | | |
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| agc Ser | ttc Phe | gtg Val | gcg Ala | gcg Ala 85 | gcc Ala | aac Asn | gcc Ala | atc Ile | gca Ala 90 | tcc Ser | tcc Ser | ggt Gly | gcc Ala | cgc Arg 95 | ccg Pro | 288 |
| gtg Val | ttc Phe | tgc Cys | gac Asp 100 | gtc Val | gac Asp | ccc Pro | cgg Arg | acg Thr 105 | ttg Leu | aac Asn | ccc Pro | acg Thr | ctg Leu 110 | gat Asp | gat Asp | 336 |
| gtg Val | gcg Ala | agg Arg 115 | gcc Ala | atc Ile | acg Thr | ccg Pro | gcg Ala 120 | acc Thr | aag Lys | gcc Ala | gta Val | ttg Leu 125 | ctg Leu | ctc Leu | cac His | 384 |
| tat Tyr | gga Gly 130 | gga Gly | tcg Ser | ccg Pro | gga Gly 135 | gaa Glu | gtc Val | acc Thr | gcg Ala | atc Ile | gcc Ala 140 | gat Asp | ttc Phe | tgc Cys | cgt Arg | 432 |
| gaa Glu 145 | aag Lys | ggc Gly | ctc Leu | atg Met | ctc Leu 150 | atc Ile | gag Glu | gac Asp | tcc Ser | gcc Ala 155 | tgc Cys | gcg Ala | gtg Val | gca Ala | tcg Ser 160 | 480 |
| tcc Ser | gtg Val | cac His | ggc Gly 165 | acc Thr | gct Ala | tgc Cys | gga Gly | acc Thr | ttt Phe 170 | ggt Gly | gac Asp | ctg Leu | gcc Ala | acg Thr 175 | tgg Trp | 528 |
| agt Ser | ttc Phe | gat Asp | gcg Ala 180 | atg Met | aag Lys | atc Ile | ctg Leu | gtc Val 185 | acc Thr | ggg Gly | gat Asp | ggg Gly | ggc Gly 190 | atg Met | ttc Phe | 576 |
| tac Tyr | gcg Ala | gcg Ala 195 | gat Asp | ccg Pro | gag Glu | ctg Leu | gcg Ala 200 | cac His | cgc Arg | gca Ala | aga Arg | cga Arg 205 | ctc Leu | gcc Ala | tac Tyr | 624 |
| cac His | ggt Gly 210 | ctt Leu | gag Glu | cag Gln | atg Met | agc Ser 215 | gga Gly | ttc Phe | gat Asp | tcg Ser | gcc Ala 220 | aag Lys | tct Ser | tcc Ser | aac Asn | 672 |
| cgc Arg 225 | tgg Trp | tgg Trp | gat Asp | att Ile | cgc Arg 230 | gtc Val | gaa Glu | gac Asp | atc Ile | ggc Gly 235 | cag Gln | cgg Arg | ctg Leu | atc Ile | ggg Gly 240 | 720 |
| aac Asn | gac Asp | atg Met | acg Thr | gca Ala 245 | gcg Ala | ctt Leu | ggc Gly | agc Ser | gtg Val 250 | cag Gln | ctg Leu | cgc Arg | aaa Lys | ctg Leu 255 | cca Pro | 768 |
| gaa Glu | ttc Phe | atc Ile | aac Asn 260 | agg Arg | cgt Arg | aga Arg | gaa Glu | atc Ile 265 | gct Ala | acg Thr | cag Gln | tac Tyr | gac Asp 270 | cgg Arg | ttg Leu | 816 |
| ctt Leu | tcc Ser | gat Asp 275 | gtg Val | ccg Pro | ggt Gly | gtc Val | ctc Leu 280 | cta Leu | ccg Pro | ccg Pro | acg Thr | cta Leu 285 | ccg Pro | gat Asp | ggg Gly | 864 |
| cac His | gtc Val 290 | tcg Ser | tca Ser | cac His | tac Tyr | ttc Phe 295 | tac Tyr | tgg Trp | gtc Val | cag Gln | ctg Leu 300 | gct Ala | ccg Pro | gag Glu | atc Ile | 912 |
| cgc Arg | gac Asp | cag Gln | gtg Val | gcg Ala | cag Gln | caa Gln | atg Met | ctg Leu | gaa Glu | cgc Arg | ggc Gly | atc Ile | tac Tyr | acg Thr | agc Ser | 960 |

| 305 | LeA33955-US | | | | | | | | | | 315 | 320 | | | | | |
|---|-------------|--|--|--|--|--|--|--|--|--|-----|-----|--|--|--|--|--|
| tac cgc tac ccg ccc ctg cac aag gtc ccc atc tac cgc gcg gac tgc | 1008 | | | | | | | | | | | | | | | | |
| Tyr Arg Tyr Pro Pro Leu His Lys Val Pro Ile Tyr Arg Ala Asp Cys | | | | | | | | | | | | | | | | | |
| | 325 330 335 | | | | | | | | | | | | | | | | |
| aag ctg cct tct gcg gag cac gcc tgc cgc aga aca ctc ctg cta cca | 1056 | | | | | | | | | | | | | | | | |
| Lys Leu Pro Ser Ala Glu His Ala Cys Arg Arg Thr Leu Leu Pro | | | | | | | | | | | | | | | | | |
| | 340 345 350 | | | | | | | | | | | | | | | | |
| ctg cac cca agc ctt gac gac gcc gag gtg cgc acg gtg gct gac gag | 1104 | | | | | | | | | | | | | | | | |
| Leu His Pro Ser Leu Asp Asp Ala Glu Val Arg Thr Val Ala Asp Glu | | | | | | | | | | | | | | | | | |
| | 355 360 365 | | | | | | | | | | | | | | | | |
| ttc cag aag gcc gtc gaa cac cac atc agc caa aga tca cca ctc cga | 1152 | | | | | | | | | | | | | | | | |
| Phe Gln Lys Ala Val Glu His His Ile Ser Gln Arg Ser Pro Leu Arg | | | | | | | | | | | | | | | | | |
| | 370 375 380 | | | | | | | | | | | | | | | | |
| aag tga | 1158 | | | | | | | | | | | | | | | | |
| Lys | | | | | | | | | | | | | | | | | |
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 Arg Thr Phe Glu Ala Glu Phe Ala His His Leu Gly Val Asp Pro Glu
 35 40 45
 Gln Val Val Phe Leu Asn Ser Gly Thr Ala Ala Leu Phe Leu Thr Val
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 Gln Val Leu Asp Leu Gly Pro Gly Asp Asp Val Val Leu Pro Ser Ile
 65 70 75 80
 Ser Phe Val Ala Ala Ala Asn Ala Ile Ala Ser Ser Gly Ala Arg Pro
 85 90 95
 Val Phe Cys Asp Val Asp Pro Arg Thr Leu Asn Pro Thr Leu Asp Asp
 100 105 110
 Val Ala Arg Ala Ile Thr Pro Ala Thr Lys Ala Val Leu Leu Leu His
 115 120 125
 Tyr Gly Gly Ser Pro Gly Glu Val Thr Ala Ile Ala Asp Phe Cys Arg
 130 135 140
 Glu Lys Gly Leu Met Leu Ile Glu Asp Ser Ala Cys Ala Val Ala Ser
 145 150 155 160
 Ser Val His Gly Thr Ala Cys Gly Thr Phe Gly Asp Leu Ala Thr Trp
 165 170 175
 Ser Phe Asp Ala Met Lys Ile Leu Val Thr Gly Asp Gly Gly Met Phe

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180 185 190

Tyr Ala Ala Asp Pro Glu Leu Ala His Arg Ala Arg Arg Leu Ala Tyr
195 200 205

His Gly Leu Glu Gln Met Ser Gly Phe Asp Ser Ala Lys Ser Ser Asn
210 215 220

Arg Trp Trp Asp Ile Arg Val Glu Asp Ile Gly Gln Arg Leu Ile Gly
225 230 235 240

Asn Asp Met Thr Ala Ala Leu Gly Ser Val Gln Leu Arg Lys Leu Pro
245 250 255

Glu Phe Ile Asn Arg Arg Arg Glu Ile Ala Thr Gln Tyr Asp Arg Leu
260 265 270

Leu Ser Asp Val Pro Gly Val Leu Leu Pro Pro Thr Leu Pro Asp Gly
275 280 285

His Val Ser Ser His Tyr Phe Tyr Trp Val Gln Leu Ala Pro Glu Ile
290 295 300

Arg Asp Gln Val Ala Gln Gln Met Leu Glu Arg Gly Ile Tyr Thr Ser
305 310 315 320

Tyr Arg Tyr Pro Pro Leu His Lys Val Pro Ile Tyr Arg Ala Asp Cys
325 330 335

Lys Leu Pro Ser Ala Glu His Ala Cys Arg Arg Thr Leu Leu Leu Pro
340 345 350

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Lys
385

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Pro Asp His Ala Asp Ile Tyr Asp Ala Ile His Ser Ala Arg Gly Arg
20 25 30

gac tgg gca gcc gag gcc ggg gaa gta gtc cag ctc gta cgc acc agg 144
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| | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Asp | Trp | Ala | Ala | Glu | Ala | Gly | Glu | Val | Val | Gln | Leu | Val | Arg | Thr | Arg | |
| | | 35 | | | | | 40 | | | | 45 | | | | | |
| ctg | ccc | gaa | gca | cag | tcc | cta | ctc | gac | gtc | gcc | tgt | ggg | acc | ggg | gcg | 192 |
| Leu | Pro | Glu | Ala | Gln | Ser | Leu | Leu | Asp | Val | Ala | Cys | Gly | Thr | Gly | Ala | |
| | 50 | | | | | 55 | | | | | 60 | | | | | |
| cac | cta | gag | cga | ttc | cgt | gcc | gaa | tac | gcg | aag | gtc | gcg | ggg | ctt | gaa | 240 |
| His | Leu | Glu | Arg | Phe | Arg | Ala | Glu | Tyr | Ala | Lys | Val | Ala | Gly | Leu | Glu | |
| | 65 | | | | 70 | | | | | 75 | | | | | 80 | |
| ctg | tcc | gat | gcg | atg | cgg | gag | atc | gcg | atc | aga | cga | gtc | cct | gag | gta | 288 |
| Leu | Ser | Asp | Ala | Met | Arg | Glu | Ile | Ala | Ile | Arg | Arg | Val | Pro | Glu | Val | |
| | | | | 85 | | | | 90 | | | | | | 95 | | |
| ccg | att | cac | atc | ggg | gac | atc | cgc | gat | ttc | gac | ctc | ggc | gag | cca | ttc | 336 |
| Pro | Ile | His | Ile | Gly | Asp | Ile | Arg | Asp | Phe | Asp | Leu | Gly | Glu | Pro | Phe | |
| | | | 100 | | | | | 105 | | | | | 110 | | | |
| gac | gtc | atc | acc | tgc | ctg | tgc | ttt | acc | gcg | gct | tac | atg | cgg | acc | gtt | 384 |
| Asp | Val | Ile | Thr | Cys | Leu | Cys | Phe | Thr | Ala | Ala | Tyr | Met | Arg | Thr | Val | |
| | | 115 | | | | | 120 | | | | | 125 | | | | |
| gac | gac | ctg | cga | cgc | gtg | acg | cgg | aac | atg | gcc | cgg | cac | ctg | gcc | cct | 432 |
| Asp | Asp | Leu | Arg | Arg | Val | Thr | Arg | Asn | Met | Ala | Arg | His | Leu | Ala | Pro | |
| | 130 | | | | | 135 | | | | | 140 | | | | | |
| ggg | gga | gtc | gcg | gtc | atc | gaa | ccc | tgg | tgg | ttt | ccc | gac | aag | ttc | atc | 480 |
| Gly | Gly | Val | Ala | Val | Ile | Glu | Pro | Trp | Trp | Phe | Pro | Asp | Lys | Phe | Ile | |
| | 145 | | | | 150 | | | | | 155 | | | | | 160 | |
| gac | ggg | ttc | gtc | acc | gga | gcc | gtc | gcg | cac | cac | ggc | gag | cgg | gtg | atc | 528 |
| Asp | Gly | Phe | Val | Thr | Gly | Ala | Val | Ala | His | His | Gly | Glu | Arg | Val | Ile | |
| | | | | 165 | | | | | 170 | | | | | 175 | | |
| agc | cgg | cta | tcg | cac | tcg | gtc | ctg | gag | ggc | cgt | acg | agc | cgg | atg | acc | 576 |
| Ser | Arg | Leu | Ser | His | Ser | Val | Leu | Glu | Gly | Arg | Thr | Ser | Arg | Met | Thr | |
| | | | 180 | | | | | 185 | | | | | 190 | | | |
| gtc | cgc | tac | aca | gtc | gcc | gaa | ccc | acc | ggg | atc | cgg | gac | ttc | aca | gag | 624 |
| Val | Arg | Tyr | Thr | Val | Ala | Glu | Pro | Thr | Gly | Ile | Arg | Asp | Phe | Thr | Glu | |
| | | 195 | | | | | 200 | | | | | 205 | | | | |
| ttc | gaa | atc | ctc | tcg | ctg | ttc | act | gag | gac | gag | tac | acc | gcc | gcg | ctc | 672 |
| Phe | Glu | Ile | Leu | Ser | Leu | Phe | Thr | Glu | Asp | Glu | Tyr | Thr | Ala | Ala | Leu | |
| | 210 | | | | | 215 | | | | | 220 | | | | | |
| gaa | gac | gca | ggg | atc | cgc | gcg | gaa | tac | ctt | cct | gga | gca | ccg | aac | ggc | 720 |
| Glu | Asp | Ala | Gly | Ile | Arg | Ala | Glu | Tyr | Leu | Pro | Gly | Ala | Pro | Asn | Gly | |
| | 225 | | | | 230 | | | | | 235 | | | | | 240 | |
| cga | ggc | ctg | ttc | gtc | gga | atc | cgc | aac | tga | | | | | | | 750 |
| Arg | Gly | Leu | Phe | Val | Gly | Ile | Arg | Asn | | | | | | | | |
| | | | | 245 | | | | | | | | | | | | |

<210> 36
 <211> 249
 <212> PRT
 <213> Saccharopolyspora spinosa

<400> 36
 Met Ser Arg Val Ser Asp Thr Phe Ala Glu Thr Ser Ser Val Tyr Ser
 Page 110

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| | | | |
|-------------|-----------------------------|-------------------------|-------------|
| 1 | 5 | 10 | 15 |
| Pro Asp His | Ala Asp Ile Tyr Asp | Ala Ile His Ser Ala Arg | Gly Arg |
| | 20 | 25 | 30 |
| Asp Trp Ala | Ala Glu Ala Gly Glu | Val Val Gln Leu Val | Arg Thr Arg |
| | 35 | 40 | 45 |
| Leu Pro Glu | Ala Gln Ser Leu Leu Asp | Val Ala Cys Gly Thr | Gly Ala |
| | 50 | 55 | 60 |
| His Leu Glu | Arg Phe Arg Ala Glu Tyr | Ala Lys Val Ala Gly | Leu Glu |
| | 65 | 70 | 75 |
| Leu Ser Asp | Ala Met Arg Glu Ile Ala | Ile Arg Arg Val Pro | Glu Val |
| | 85 | 90 | 95 |
| Pro Ile His | Ile Gly Asp Ile Arg Asp | Phe Asp Leu Gly Glu | Pro Phe |
| | 100 | 105 | 110 |
| Asp Val Ile | Thr Cys Leu Cys Phe Thr | Ala Ala Tyr Met Arg | Thr Val |
| | 115 | 120 | 125 |
| Asp Asp Leu | Arg Arg Val Thr Arg | Asn Met Ala Arg His | Leu Ala Pro |
| | 130 | 135 | 140 |
| Gly Gly Val | Ala Val Ile Glu Pro Trp Trp | Phe Pro Asp Lys Phe | Ile |
| | 145 | 150 | 155 |
| Asp Gly Phe | Val Thr Gly Ala Val Ala | His His Gly Glu Arg | Val Ile |
| | 165 | 170 | 175 |
| Ser Arg Leu | Ser His Ser Val Leu Glu | Gly Arg Thr Ser Arg | Met Thr |
| | 180 | 185 | 190 |
| Val Arg Tyr | Thr Val Ala Glu Pro Thr | Gly Ile Arg Asp Phe | Thr Glu |
| | 195 | 200 | 205 |
| Phe Glu Ile | Leu Ser Leu Phe Thr Glu | Asp Glu Tyr Thr Ala | Ala Leu |
| | 210 | 215 | 220 |
| Glu Asp Ala | Gly Ile Arg Ala Glu Tyr | Leu Pro Gly Ala Pro | Asn Gly |
| | 225 | 230 | 235 |
| Arg Gly Leu | Phe Val Gly Ile Arg Asn | | |
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 <223> ORF16; 3,4-reductase

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| Met Ser Glu Gln Thr Ile Ala Leu Val Thr Gly Ala Asn Lys Gly Ile | |
| 1 5 10 15 | |

LeA33955-US

| | |
|---|-----------------|
| gga tac gag atc gcg gcc ggg ctc ggc gcg ctg ggg tgg agc gtc gga | 96 |
| Gly Tyr Glu Ile Ala Ala Gly Leu Gly Ala Leu Gly Trp Ser Val Gly | |
| | 20 25 30 |
| atc ggg gca cgg gac cac cag cgc ggg gag gat gcc gtg gcg aaa ttg | 144 |
| Ile Gly Ala Arg Asp His Gln Arg Gly Glu Asp Ala Val Ala Lys Leu | |
| | 35 40 45 |
| cgt gcg gac ggc gtc gat gcg ttc gcg gta tcc ctg gac gtg aca gac | 192 |
| Arg Ala Asp Gly Val Asp Ala Phe Ala Val Ser Leu Asp Val Thr Asp | |
| | 50 55 60 |
| gac gcg agc gtc gcg gct gct gcg gct ctg ctc gag gag cgc gcc ggc | 240 |
| Asp Ala Ser Val Ala Ala Ala Ala Leu Leu Glu Glu Arg Ala Gly | |
| | 65 70 75 80 |
| cgg ctc gat gtg ctg gtt aat aac gcc ggc atc gcc ggg gca tgg ccg | 288 |
| Arg Leu Asp Val Leu Val Asn Asn Ala Gly Ile Ala Gly Ala Trp Pro | |
| | 85 90 95 |
| gag gag ccc tcg acc gtc aca ccg gcg agc ctc cgg gcg gtg gtg gag | 336 |
| Glu Glu Pro Ser Thr Val Thr Pro Ala Ser Leu Arg Ala Val Val Glu | |
| | 100 105 110 |
| acc aac gtg atc ggc gtc gtt cgg gtt acc aac gct atg ctg ccg ttg | 384 |
| Thr Asn Val Ile Gly Val Val Arg Val Thr Asn Ala Met Leu Pro Leu | |
| | 115 120 125 |
| cta cgc cgc tcc gag cgc ccg ccg atc gtc aac cag tcc agc cac gtc | 432 |
| Leu Arg Arg Ser Glu Arg Pro Arg Ile Val Asn Gln Ser Ser His Val | |
| | 130 135 140 |
| gct tcc ctg acc ttg caa acc acg ccg ggc gtc gac ctc ggc ggg atc | 480 |
| Ala Ser Leu Thr Leu Gln Thr Thr Pro Gly Val Asp Leu Gly Gly Ile | |
| | 145 150 155 160 |
| agc gga gcc tac tca ccg tcg aag acg ttc ctc aac gcg atc acc atc | 528 |
| Ser Gly Ala Tyr Ser Pro Ser Lys Thr Phe Leu Asn Ala Ile Thr Ile | |
| | 165 170 175 |
| cag tac gcc aag gaa ctc agc gat acc aac atc aaa atc aac aac gcc | 576 |
| Gln Tyr Ala Lys Glu Leu Ser Asp Thr Asn Ile Lys Ile Asn Asn Ala | |
| | 180 185 190 |
| tgc ccc ggc tac gtc gcg acc gac ctt aac ggc ttc cac gga acc agc | 624 |
| Cys Pro Gly Tyr Val Ala Thr Asp Leu Asn Gly Phe His Gly Thr Ser | |
| | 195 200 205 |
| acg ccg gca gac ggt gcc agg atc gcc att cgg ctc gcc acg ctg cca | 672 |
| Thr Pro Ala Asp Gly Ala Arg Ile Ala Ile Arg Leu Ala Thr Leu Pro | |
| | 210 215 220 |
| gac gac ggc ccg acc gga ggc atg ttc gac gac gcc ggg aat gtg ccc | 720 |
| Asp Asp Gly Pro Thr Gly Gly Met Phe Asp Asp Ala Gly Asn Val Pro | |
| | 225 230 235 240 |
| tgg tga | 726 |
| Trp | |

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<212> PRT

<213> Saccharopolyspora spinosa

<400> 38

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 20 25 30
 Ile Gly Ala Arg Asp His Gln Arg Gly Glu Asp Ala Val Ala Lys Leu
 35 40 45
 Arg Ala Asp Gly Val Asp Ala Phe Ala Val Ser Leu Asp Val Thr Asp
 50 55 60
 Asp Ala Ser Val Ala Ala Ala Ala Ala Leu Leu Glu Glu Arg Ala Gly
 65 70 75 80
 Arg Leu Asp Val Leu Val Asn Asn Ala Gly Ile Ala Gly Ala Trp Pro
 85 90 95
 Glu Glu Pro Ser Thr Val Thr Pro Ala Ser Leu Arg Ala Val Val Glu
 100 105 110
 Thr Asn Val Ile Gly Val Val Arg Val Thr Asn Ala Met Leu Pro Leu
 115 120 125
 Leu Arg Arg Ser Glu Arg Pro Arg Ile Val Asn Gln Ser Ser His Val
 130 135 140
 Ala Ser Leu Thr Leu Gln Thr Thr Pro Gly Val Asp Leu Gly Gly Ile
 145 150 155 160
 Ser Gly Ala Tyr Ser Pro Ser Lys Thr Phe Leu Asn Ala Ile Thr Ile
 165 170 175
 Gln Tyr Ala Lys Glu Leu Ser Asp Thr Asn Ile Lys Ile Asn Asn Ala
 180 185 190
 Cys Pro Gly Tyr Val Ala Thr Asp Leu Asn Gly Phe His Gly Thr Ser
 195 200 205
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 210 215 220
 Asp Asp Gly Pro Thr Gly Gly Met Phe Asp Asp Ala Gly Asn Val Pro
 225 230 235 240
 Trp

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<221> CDS

<222> (1)..(834)

<223> ORF17; transcription regulator

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Met Glu Thr Arg Glu Leu Arg Tyr Phe Val Ala Val Ala Glu Glu Leu
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cac ttc ggc cgg gcc gcc cag cgc ctg ggc atc gcc cag ccg ccg ctg   96
His Phe Gly Arg Ala Ala Gln Arg Leu Gly Ile Ala Gln Pro Pro Leu
      20      25      30

tcg cgg acg atc gcc cag ctc gag caa cga ctc gga gtc gtg ttg ctg  144
Ser Arg Thr Ile Ala Gln Leu Glu Gln Arg Leu Gly Val Val Leu Leu
      35      40      45

caa cgc acc agc cgc aaa gtc tcg ctc acc gaa gcc ggg gca atg ctg  192
Gln Arg Thr Ser Arg Lys Val Ser Leu Thr Glu Ala Gly Ala Met Leu
      50      55      60

ctg acc gaa ggc cgg gcg atc ctc ggc gcg ctg gca gca gcc gag cga  240
Leu Thr Glu Gly Arg Ala Ile Leu Gly Ala Leu Ala Ala Glu Arg
      65      70      75      80

cgc acc cag cgt gcc gcg acg agc cag ccc tcg cta gtc ctg gct gcc  288
Arg Thr Gln Arg Ala Ala Thr Ser Gln Pro Ser Leu Val Leu Ala Ala
      85      90      95

aag gcc ggc gcc tcc ggt gag ctg ctg gcg aag ttg ctc gac gcg tac  336
Lys Ala Gly Ala Ser Gly Glu Leu Leu Ala Lys Leu Leu Asp Ala Tyr
      100      105      110

gcc gcc gag ccg gga gcc gtg gcc gtc gac ctg ctg ctc tgc gaa tcc  384
Ala Ala Glu Pro Gly Ala Val Ala Val Asp Leu Leu Leu Cys Glu Ser
      115      120      125

cag ccc cag aaa acg ctg cat gac ggc cgg gcc gac gtg gcg ctg ttg  432
Gln Pro Gln Lys Thr Leu His Asp Gly Arg Ala Asp Val Ala Leu Leu
      130      135      140

cat caa ccc ttc gac ccg acg gcc gaa ctc gac atc gaa att ctg aac  480
His Gln Pro Phe Asp Pro Thr Ala Glu Leu Asp Ile Glu Ile Leu Asn
      145      150      155      160

acc gag caa caa gtc gcc att ctt ccg acc tcg cat ccg ctt gcc agc  528
Thr Glu Gln Gln Val Ala Ile Leu Pro Thr Ser His Pro Leu Ala Ser
      165      170      175

gag ccc cat gta cgg atg gcg gat gtc agc tca ctg ccg gat ctc ccg  576
Glu Pro His Val Arg Met Ala Asp Val Ser Ser Leu Pro Asp Leu Pro
      180      185      190

ctt gcg cgc tgg ccc ggc ccc gac ggc gtc tat cca gat ggc ccc ggc  624
Leu Ala Arg Trp Pro Gly Pro Asp Gly Val Tyr Pro Asp Gly Pro Gly
      195      200      205

gtg gaa gta cgc aac cag acg caa ctg ttc caa atg atc gca ctc ggc  672
Val Glu Val Arg Asn Gln Thr Gln Leu Phe Gln Met Ile Ala Leu Gly
      210      215      220

cgc act acc gtg gtc atg ccc gaa tcc agt cgc gtc aac ctg ctc gaa  720
Arg Thr Thr Val Val Met Pro Glu Ser Ser Arg Val Asn Leu Leu Glu
      225      230      235      240

ggc ctc gcc gcc gta ccg gtt cta gac gcg ccg gac gtg acg aca gtc  768

```

| LeA33955-US | | | | | | | | | | | | | | | | |
|-------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Gly | Leu | Ala | Ala | Val | Pro | Val | Leu | Asp | Ala | Pro | Asp | Val | Thr | Thr | Val | |
| | | | | 245 | | | | | 250 | | | | | 255 | | |
| atc | gcc | tgg | ccg | ccc | cac | agc | cgc | tcc | cga | gca | ctc | gcc | ggc | ttg | gtc | 816 |
| Ile | Ala | Trp | Pro | Pro | His | Ser | Arg | Ser | Arg | Ala | Leu | Ala | Gly | Leu | Val | |
| | | | | 260 | | | | | 265 | | | | | 270 | | |
| cgc | gtg | gcc | aca | ctc | ctc | taa | | | | | | | | | | 837 |
| Arg | Val | Ala | Thr | Leu | Leu | | | | | | | | | | | |
| | | | | 275 | | | | | | | | | | | | |

<210> 40
<211> 278
<212> PRT
<213> Saccharopolyspora spinosa

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Gly Leu Ala Ala Val Pro Val Leu Asp Ala Pro Asp Val Thr Thr Val
245 250 255

Ile Ala Trp Pro Pro His Ser Arg Ser Arg Ala Leu Ala Gly Leu Val
260 265 270

Arg Val Ala Thr Leu Leu
275

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<210> 41
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<212> DNA
<213> Saccharopolyspora spinosa

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<223> ORF18; polyketide synthase
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|-------------------|-------------------|-------------------|-------------------|------------------|-------------------|-------------------|-------------------|-------------------|------------------|-------------------|-------------------|-------------------|-------------------|------------------|-------------------|-----|
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| cta Leu | ccc Pro | cag Gln | gcg Ala 20 | cct Pro | gac Asp | ccg Pro | gct Ala | tcc Ser 25 | ttc Phe | tgg Trp | cgg Arg | ttg Leu | ctg Leu 30 | cgc Arg | acc Thr | 96 |
| gga Gly | acg Thr | gac Asp 35 | gcc Ala | atc Ile | acc Thr | acg Thr | gtc Val 40 | ccg Pro | gaa Glu | ggg Gly | cgg Arg | tgg Trp 45 | ggc Gly | gac Asp | ccg Pro | 144 |
| ttg Leu | cct Pro 50 | ggt Gly | cgg Arg | gat Asp | gcg Ala | ccc Pro 55 | aag Lys | ggc Gly | ccg Pro | gaa Glu | tgg Trp 60 | ggt Gly | ggt Gly | ttc Phe | ctg Leu | 192 |
| gct Ala 65 | gat Asp | gtc Val | gac Asp | tgc Cys | ttc Phe 70 | gat Asp | ccc Pro | gag Glu | ttc Phe | ttc Phe 75 | ggg Gly | atc Ile | tcg Ser | ccg Pro | cga Arg 80 | 240 |
| gaa Glu | gcg Ala | gca Ala | gcc Ala | gtg Val 85 | gat Asp | ccc Pro | cag Gln | cag Gln | agg Arg 90 | ctg Leu | gct Ala | ctg Leu | gag Glu | ctc Leu 95 | gcc Ala | 288 |
| tgg Trp | gag Glu | gca Ala | ctc Leu 100 | gaa Glu | gac Asp | gcc Ala | ggt Gly | atc Ile 105 | ccc Pro | gcc Ala | ggc Gly | gag Glu | ctg Leu 110 | cgc Arg | ggt Gly | 336 |
| act Thr | gcc Ala | gcc Ala 115 | ggt Gly | gtg Val | ttc Phe | atg Met | ggg Gly 120 | gcg Ala | atc Ile | tct Ser | gac Asp | gac Asp 125 | tac Tyr | gcc Ala | gcc Ala | 384 |
| ctg Leu | ctg Leu 130 | cgc Arg | gag Glu | agc Ser | ccg Pro | ccg Pro 135 | gaa Glu | gtg Val | gct Ala | gcg Ala | cag Gln 140 | tac Tyr | cgc Arg | ctc Leu | acc Thr | 432 |
| ggc Gly 145 | acc Thr | cat His | cga Arg | agc Ser | ctg Leu 150 | atc Ile | gcc Ala | aac Asn | cgc Arg | gtg Val 155 | tcc Ser | tat Tyr | gtg Val | ctc Leu | ggc Gly 160 | 480 |
| ctg | cgc | ggg | cca | agc | ctg | acg | gtg | gat | tca | ggt | cag | tcc | tcg | tcc | ctg | 528 |

| LeA33955-US | | | | | | | | | | | | | | | | |
|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|------|
| Leu | Arg | Gly | Pro | Ser 165 | Leu | Thr | Val | Asp | Ser 170 | Gly | Gln | Ser | Ser | Ser 175 | Leu | |
| gtc Val | ggc Gly | gtg Val | cat His 180 | ctc Leu | gcc Ala | agc Ser | gag Glu | agc Ser 185 | ctg Leu | cga Arg | cgg Arg | ggt Gly | gag Glu 190 | tgc Cys | acg Thr | 576 |
| atc Ile | gca Ala | ctc Leu 195 | gcc Ala | ggc Gly | ggc Gly | gtg Val | aac Asn 200 | ctc Leu | aac Asn | ctg Leu | gcc Ala | gcc Ala 205 | gag Glu | agc Ser | aac Asn | 624 |
| agc Ser | gct Ala 210 | ctg Leu | atg Met | gac Asp | ttc Phe | ggc Gly 215 | gcg Ala | ctc Leu | tcc Ser | ccg Pro | gac Asp 220 | ggt Gly | cgc Arg | tgc Cys | ttc Phe | 672 |
| acc Thr 225 | ttc Phe | gat Asp | gtg Val | cgg Arg | gcg Ala 230 | aac Asn | ggt Gly | tac Tyr | gtc Val | cgt Arg 235 | ggt Gly | gag Glu | ggc Gly | ggc Gly | ggc Gly 240 | 720 |
| ctt Leu | gtc Val | gtg Val | ctg Leu | aag Lys 245 | aag Lys | gcc Ala | gat Asp | cag Gln | gcg Ala 250 | cac His | gcc Ala | gat Asp | ggc Gly | gac Asp 255 | cgg Arg | 768 |
| atc Ile | tac Tyr | tgc Cys | ctc Leu 260 | atc Ile | cgc Arg | ggc Gly | agc Ser | gcg Ala 265 | gtc Val | aac Asn | aac Asn | gat Asp | ggg Gly 270 | ggc Gly | ggt Gly | 816 |
| gcc Ala | ggg Gly | ctc Leu 275 | acc Thr | gtt Val | ccg Pro | gcg Ala | gcg Ala 280 | gac Asp | gcc Ala | cag Gln | gcg Ala | gag Glu 285 | ctg Leu | ctg Leu | cgc Arg | 864 |
| cag Gln | gca Ala 290 | tac Tyr | cgg Arg | aac Asn | gcg Ala | ggc Gly 295 | gtc Val | gac Asp | ccg Pro | gcc Ala | gcc Ala 300 | gtg Val | cag Gln | tat Tyr | gtc Val | 912 |
| gag Glu 305 | ctc Leu | cac His | ggc Gly | agc Ser | gcg Ala 310 | acc Thr | agg Arg | gtc Val | ggg Gly | gat Asp 315 | ccc Pro | gtc Val | gaa Glu | gca Ala | gca Ala 320 | 960 |
| gcc Ala | ctc Leu | gga Gly | gct Ala | gtc Val 325 | ctg Leu | ggg Gly | gcg Ala | gcg Ala | aga Arg 330 | cgg Arg | ccc Pro | ggc Gly | gac Asp | gag Glu 335 | ctg Leu | 1008 |
| cgt Arg | gtg Val | ggg Gly | tcg Ser 340 | gcg Ala | aag Lys | acc Thr | aac Asn | gtc Val 345 | ggc Gly | cat His | ctg Leu | gaa Glu | gca Ala 350 | gcg Ala | gcg Ala | 1056 |
| ggc Gly | gtc Val | acc Thr 355 | ggg Gly | ttg Leu | ctg Leu | aag Lys | acc Thr 360 | gca Ala | ctc Leu | agc Ser | atc Ile | tgg Trp 365 | cac His | cgc Arg | gaa Glu | 1104 |
| ctg Leu | ccg Pro 370 | ccg Pro | agt Ser | ctt Leu | cat His | ttc Phe 375 | acc Thr | gcc Ala | ccc Pro | aac Asn | ccg Pro 380 | gaa Glu | atc Ile | ccg Pro | ctg Leu | 1152 |
| gac Asp 385 | gaa Glu | ttg Leu | aac Asn | cta Leu | cgc Arg 390 | gtc Val | cag Gln | cgt Arg | gat Asp | ctg Leu 395 | cgg Arg | ccg Pro | tgg Trp | ccg Pro | gag Glu 400 | 1200 |
| agc Ser | gag Glu | ggg Gly | ccg Pro | ctg Leu 405 | ctg Leu | gcc Ala | ggc Gly | gtc Val | agc Ser 410 | gcc Ala | ttc Phe | gga Gly | atg Met | gga Gly 415 | ggc Gly | 1248 |

| LeA33955-US | | | | | | | | | | | | | | | | |
|-------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|
| acg | aac | tgc | cac | ctg | gtg | ctc | tcc | ggc | acg | tcc | cgg | gtg | gag | cga | cgg | 1296 |
| Thr | Asn | Cys | His | Leu | Val | Leu | Ser | Gly | Thr | Ser | Arg | Val | Glu | Arg | Arg | |
| | | | 420 | | | | | 425 | | | | | 430 | | | |
| cgc | agt | gga | ccc | gct | gag | gcg | acc | atg | ccg | tgg | gtc | ttg | tcg | gcc | aga | 1344 |
| Arg | Ser | Gly | Pro | Ala | Glu | Ala | Thr | Met | Pro | Trp | Val | Leu | Ser | Ala | Arg | |
| | | 435 | | | | | 440 | | | | | 445 | | | | |
| aca | ccg | gtc | gca | ttg | cgt | gcg | cag | gcg | gcg | cgc | ttg | cac | acg | cac | ctc | 1392 |
| Thr | Pro | Val | Ala | Leu | Arg | Ala | Gln | Ala | Ala | Arg | Leu | His | Thr | His | Leu | |
| | 450 | | | | | 455 | | | | | 460 | | | | | |
| aat | acg | gcc | ggt | caa | agt | ccg | ttg | gac | gtc | gcc | tac | tca | ctg | gcg | acc | 1440 |
| Asn | Thr | Ala | Gly | Gln | Ser | Pro | Leu | Asp | Val | Ala | Tyr | Ser | Leu | Ala | Thr | |
| 465 | | | | | 470 | | | | | 475 | | | | | 480 | |
| act | cga | tcc | gcg | ctg | ccg | cac | cgg | gcc | gcg | ctg | gtc | gcg | gac | gac | gaa | 1488 |
| Thr | Arg | Ser | Ala | Leu | Pro | His | Arg | Ala | Ala | Leu | Val | Ala | Asp | Asp | Glu | |
| | | | | 485 | | | | | 490 | | | | | 495 | | |
| ccg | aaa | ctg | ctc | gcc | ggg | ttg | aag | gcc | ctc | gct | gac | ggc | gac | gac | gcg | 1536 |
| Pro | Lys | Leu | Leu | Ala | Gly | Leu | Lys | Ala | Leu | Ala | Asp | Gly | Asp | Asp | Ala | |
| | | | 500 | | | | | 505 | | | | | 510 | | | |
| ccc | acg | ctg | tgc | cac | ggc | gcg | act | tcc | ggc | gag | cgg | gca | gcg | gtc | ttc | 1584 |
| Pro | Thr | Leu | Cys | His | Gly | Ala | Thr | Ser | Gly | Glu | Arg | Ala | Ala | Val | Phe | |
| | | 515 | | | | | 520 | | | | | 525 | | | | |
| gtc | ttt | ccc | gga | cag | ggc | agc | cag | tgg | atc | ggg | atg | ggg | agg | cag | ctg | 1632 |
| Val | Phe | Pro | Gly | Gln | Gly | Ser | Gln | Trp | Ile | Gly | Met | Gly | Arg | Gln | Leu | |
| | 530 | | | | | 535 | | | | | 540 | | | | | |
| ctc | gaa | acc | tcc | gag | gtt | ttc | gcg | gcg | tcg | atg | tcg | gac | tgc | gcc | gac | 1680 |
| Leu | Glu | Thr | Ser | Glu | Val | Phe | Ala | Ala | Ser | Met | Ser | Asp | Cys | Ala | Asp | |
| 545 | | | | | 550 | | | | | 555 | | | | | 560 | |
| gca | ttg | gcg | ccg | cac | ctg | gat | tgg | tcc | ctg | ctg | gat | gtg | ctg | cgc | aac | 1728 |
| Ala | Leu | Ala | Pro | His | Leu | Asp | Trp | Ser | Leu | Leu | Asp | Val | Leu | Arg | Asn | |
| | | | | 565 | | | | | 570 | | | | | 575 | | |
| gcg | gcc | ggc | gct | gcg | cac | ctt | gac | cac | gac | gat | gtc | gtc | cag | ccc | gcg | 1776 |
| Ala | Ala | Gly | Ala | Ala | His | Leu | Asp | His | Asp | Asp | Val | Val | Gln | Pro | Ala | |
| | | | 580 | | | | | 585 | | | | | 590 | | | |
| ctg | ttc | gcc | atc | atg | gtc | tcg | ctc | gcg | gag | ctc | tgg | cgt | tcg | tgg | ggc | 1824 |
| Leu | Phe | Ala | Ile | Met | Val | Ser | Leu | Ala | Glu | Leu | Trp | Arg | Ser | Trp | Gly | |
| | | 595 | | | | | 600 | | | | | 605 | | | | |
| gtg | cgt | ccg | gtg | gcg | gtc | gtc | ggg | cac | tcg | cag | ggg | gag | atc | gcg | gcg | 1872 |
| Val | Arg | Pro | Val | Ala | Val | Val | Gly | His | Ser | Gln | Gly | Glu | Ile | Ala | Ala | |
| | 610 | | | | | 615 | | | | | 620 | | | | | |
| gcc | tgc | gtc | gcc | ggg | gcc | ctg | tcc | gtc | cgc | gat | gcc | gcc | agg | gtg | gtg | 1920 |
| Ala | Cys | Val | Ala | Gly | Ala | Leu | Ser | Val | Arg | Asp | Ala | Ala | Arg | Val | Val | |
| 625 | | | | | 630 | | | | | 635 | | | | | 640 | |
| gcg | gtg | cgc | agc | agg | ctt | ctg | acg | gcg | ctg | gcc | ggc | agt | ggc | gcg | atg | 1968 |
| Ala | Val | Arg | Ser | Arg | Leu | Leu | Thr | Ala | Leu | Ala | Gly | Ser | Gly | Ala | Met | |
| | | | | 645 | | | | | 650 | | | | | 655 | | |
| gcc | tcg | ttg | cag | cat | ccc | gcc | gaa | gag | gtg | cgg | caa | atc | ctg | ttg | ccc | 2016 |
| Ala | Ser | Leu | Gln | His | Pro | Ala | Glu | Glu | Val | Arg | Gln | Ile | Leu | Leu | Pro | |
| | | | 660 | | | | | 665 | | | | | 670 | | | |

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| | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|
| tgg | cgc | gat | cgg | atc | ggc | gtg | gcg | ggg | gtg | aac | gga | ccg | tcg | tcg | acc | 2064 |
| Trp | Arg | Asp | Arg | Ile | Gly | Val | Ala | Gly | Val | Asn | Gly | Pro | Ser | Ser | Thr | |
| | | 675 | | | | | 680 | | | | | 685 | | | | |
| ctg | gtg | tca | ggg | gac | cgg | gag | gcg | atg | gcg | gaa | ctg | ctg | gcc | gag | tgc | 2112 |
| Leu | Val | Ser | Gly | Asp | Arg | Glu | Ala | Met | Ala | Glu | Leu | Leu | Ala | Glu | Cys | |
| | 690 | | | | | 695 | | | | | 700 | | | | | |
| gca | gac | cga | gag | ctc | cgg | atg | cgc | cgg | att | ccc | gtt | gaa | tac | gcc | tcc | 2160 |
| Ala | Asp | Arg | Glu | Leu | Arg | Met | Arg | Arg | Ile | Pro | Val | Glu | Tyr | Ala | Ser | |
| 705 | | | | | 710 | | | | | 715 | | | | | 720 | |
| cat | tcg | cct | cac | atc | gag | gtt | gtc | cgg | gat | gag | ctg | ctg | ggg | ctg | ttg | 2208 |
| His | Ser | Pro | His | Ile | Glu | Val | Val | Arg | Asp | Glu | Leu | Leu | Gly | Leu | Leu | |
| | | | | 725 | | | | | 730 | | | | | 735 | | |
| gcg | ccg | gtc | gaa | ccc | agg | acg | gga | agc | atc | ccg | atc | tat | tcg | acg | acg | 2256 |
| Ala | Pro | Val | Glu | Pro | Arg | Thr | Gly | Ser | Ile | Pro | Ile | Tyr | Ser | Thr | Thr | |
| | | | 740 | | | | | 745 | | | | | 750 | | | |
| acc | ggg | gac | ctg | ctg | gac | cgg | ccg | atg | gac | gcc | gac | tac | tgg | tac | cgc | 2304 |
| Thr | Gly | Asp | Leu | Leu | Asp | Arg | Pro | Met | Asp | Ala | Asp | Tyr | Trp | Tyr | Arg | |
| | | 755 | | | | | 760 | | | | | 765 | | | | |
| aac | ctt | cgt | caa | ccg | gtg | ctg | ttc | gaa | gcg | gcc | gtc | gag | gcc | ctg | ttg | 2352 |
| Asn | Leu | Arg | Gln | Pro | Val | Leu | Phe | Glu | Ala | Ala | Val | Glu | Ala | Leu | Leu | |
| | 770 | | | | | 775 | | | | | 780 | | | | | |
| aag | cgg | ggg | tac | gac | gca | ttc | atc | gag | atc | agc | cca | cac | ccg | gtg | ctg | 2400 |
| Lys | Arg | Gly | Tyr | Asp | Ala | Phe | Ile | Glu | Ile | Ser | Pro | His | Pro | Val | Leu | |
| 785 | | | | | 790 | | | | | 795 | | | | | 800 | |
| act | gcg | aac | atc | cag | gaa | acc | gcc | gtg | cga | gca | ggg | cgg | gag | gta | gtg | 2448 |
| Thr | Ala | Asn | Ile | Gln | Glu | Thr | Ala | Val | Arg | Ala | Gly | Arg | Glu | Val | Val | |
| | | | | 805 | | | | | 810 | | | | | 815 | | |
| gcg | ctc | ggg | aca | ctc | cgc | cgc | ggc | gaa | ggg | ggc | atg | cgg | cag | gcg | ctg | 2496 |
| Ala | Leu | Gly | Thr | Leu | Arg | Arg | Gly | Glu | Gly | Gly | Met | Arg | Gln | Ala | Leu | |
| | | | 820 | | | | | 825 | | | | | 830 | | | |
| acg | tcg | ctg | gcc | aga | gca | cac | gta | cac | gga | gtg | gcc | gcg | gac | tgg | cac | 2544 |
| Thr | Ser | Leu | Ala | Arg | Ala | His | Val | His | Gly | Val | Ala | Ala | Asp | Trp | His | |
| | | 835 | | | | | 840 | | | | | 845 | | | | |
| gcg | gtc | ttc | gcc | ggg | acc | ggg | gcg | cag | cgg | gtc | gac | ctg | ccg | acg | tac | 2592 |
| Ala | Val | Phe | Ala | Gly | Thr | Gly | Ala | Gln | Arg | Val | Asp | Leu | Pro | Thr | Tyr | |
| | 850 | | | | | 855 | | | | | 860 | | | | | |
| gcc | ttt | cag | cga | cag | cgc | tac | tgg | ctg | gac | gcg | aag | ctt | ccc | gac | gtc | 2640 |
| Ala | Phe | Gln | Arg | Gln | Arg | Tyr | Trp | Leu | Asp | Ala | Lys | Leu | Pro | Asp | Val | |
| 865 | | | | | 870 | | | | | 875 | | | | | 880 | |
| gcc | atg | ccc | gag | agc | gac | gtg | tcg | acg | gcg | ttg | cgg | gaa | aag | ctg | cgg | 2688 |
| Ala | Met | Pro | Glu | Ser | Asp | Val | Ser | Thr | Ala | Leu | Arg | Glu | Lys | Leu | Arg | |
| | | | | 885 | | | | | 890 | | | | | 895 | | |
| tct | tcg | ccg | agg | gcg | gac | gtg | gac | tcg | acg | acc | ctc | acg | atg | atc | cgg | 2736 |
| Ser | Ser | Pro | Arg | Ala | Asp | Val | Asp | Ser | Thr | Thr | Leu | Thr | Met | Ile | Arg | |
| | | | 900 | | | | | 905 | | | | | 910 | | | |
| gca | cag | gca | gcc | gtg | gtc | ctc | ggc | cac | tcc | gat | ccg | aaa | gag | gtg | gac | 2784 |
| Ala | Gln | Ala | Ala | Val | Val | Leu | Gly | His | Ser | Asp | Pro | Lys | Glu | Val | Asp | |

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| 915 | 920 | 925 | |
|--|------|------|------|
| ccg gat cgg acg ttc aag gac ctg ggc ttc gat tcc tcg atg gtg gtc Pro Asp Arg Thr Phe Lys Asp Leu Gly Phe Asp Ser Ser Met Val Val | 2832 | | |
| 930 | 935 | 940 | |
| gag ctg tgc gac cgc cta aac gcc gcc aca ggt ctg cga ctc gca ccg Glu Leu Cys Asp Arg Leu Asn Ala Ala Thr Gly Leu Arg Leu Ala Pro | 2880 | | |
| 945 | 950 | 955 | 960 |
| agc gtc gtt ttc gac tgt cct acg ccg gac aag ctc gcc cgc cag gta Ser Val Val Phe Asp Cys Pro Thr Pro Asp Lys Leu Ala Arg Gln Val | 2928 | | |
| | 965 | 970 | 975 |
| cgg acg ttg ttg ttg ggc gag ccg gct ccc atg acg tca cac cgg ccg Arg Thr Leu Leu Leu Gly Glu Pro Ala Pro Met Thr Ser His Arg Pro | 2976 | | |
| | 980 | 985 | 990 |
| gac tcc gat gcg gac gag cct atc gcc gtg atc ggg atg ggc tgt cgg Asp Ser Asp Ala Asp Glu Pro Ile Ala Val Ile Gly Met Gly Cys Arg | 3024 | | |
| | 995 | 1000 | 1005 |
| ttt ccg ggt ggg gtg tcc tcg ccc gag gag ttg tgg cag ttg gtc gcc Phe Pro Gly Gly Val Ser Ser Pro Glu Glu Leu Trp Gln Leu Val Ala | 3072 | | |
| 1010 | 1015 | 1020 | |
| gct ggg cgg gac gtc gtg tcc gag ttc ccg gct gac cga ggt tgg gac Ala Gly Arg Asp Val Val Ser Glu Phe Pro Ala Asp Arg Gly Trp Asp | 3120 | | |
| 1025 | 1030 | 1035 | 1040 |
| ctg gag cgt gcg ggg aca tcg cac gtg cgc gcc ggc ggg ttc ttg cat Leu Glu Arg Ala Gly Thr Ser His Val Arg Ala Gly Gly Phe Leu His | 3168 | | |
| | 1045 | 1050 | 1055 |
| ggc gcc ccg gat ttt gac ccc ggg ttc ttc ccg att tcg ccg cgc gag Gly Ala Pro Asp Phe Asp Pro Gly Phe Phe Arg Ile Ser Pro Arg Glu | 3216 | | |
| | 1060 | 1065 | 1070 |
| gcg ttg gcg atg gat cca cag cag ccg ttg ctg ctg gaa atc gcc tgg Ala Leu Ala Met Asp Pro Gln Gln Arg Leu Leu Leu Glu Ile Ala Trp | 3264 | | |
| 1075 | 1080 | 1085 | |
| gaa gca gtc gaa cga ggc ggg atc aac ccg cag cac ctg cac gga agt Glu Ala Val Glu Arg Gly Gly Ile Asn Pro Gln His Leu His Gly Ser | 3312 | | |
| 1090 | 1095 | 1100 | |
| caa acc ggg gtc ttc gtc ggc gcg acc tcc ctg gac tac ggg cca cgc Gln Thr Gly Val Phe Val Gly Ala Thr Ser Leu Asp Tyr Gly Pro Arg | 3360 | | |
| 1105 | 1110 | 1115 | 1120 |
| ctg cac gaa gcg tcc gag gag gcg gcc ggg tac gtg ctc acc ggc agc Leu His Glu Ala Ser Glu Glu Ala Ala Gly Tyr Val Leu Thr Gly Ser | 3408 | | |
| | 1125 | 1130 | 1135 |
| acc acg agt gtg gcg tcg ggt ccg gtt gcg tat tcg ttc ggg ttc gag Thr Thr Ser Val Ala Ser Gly Arg Val Ala Tyr Ser Phe Gly Phe Glu | 3456 | | |
| | 1140 | 1145 | 1150 |
| ggc cct gcg gtg acg gtg gat acg gcg tgt tcg tcg tcg ttg gtg gcc Gly Pro Ala Val Thr Val Asp Thr Ala Cys Ser Ser Ser Leu Val Ala | 3504 | | |
| 1155 | 1160 | 1165 | |
| ctg cat ttg gcg tgt cag tcg ttg cgt tcg ggt gag tgt gat ctg gcg | 3552 | | |

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| | |
|---|------|
| Leu His Leu Ala Cys Gln Ser Leu Arg Ser Gly Glu Cys Asp Leu Ala | |
| 1170 1175 1180 | |
| ttg gcc ggt ggt gtg acc gtg atg gcc acg ccg ggg atg ttc gtg gag | 3600 |
| Leu Ala Gly Gly Val Thr Val Met Ala Thr Pro Gly Met Phe Val Glu | |
| 1185 1190 1195 1200 | |
| ttt tcg cgg cag cgt ggt ttg gcg ccg gat ggg ccg tgc aag tcg ttc | 3648 |
| Phe Ser Arg Gln Arg Gly Leu Ala Pro Asp Gly Arg Cys Lys Ser Phe | |
| 1205 1210 1215 | |
| gcg gag gcc gcc gac ggc acc ggc tgg tcc gag ggt gct ggc ctg gtt | 3696 |
| Ala Glu Ala Ala Asp Gly Thr Gly Trp Ser Glu Gly Ala Gly Leu Val | |
| 1220 1225 1230 | |
| cta ctg gag cgg ttg tcg gat gcc ccg ccg aat ggg cat gag gtg ctg | 3744 |
| Leu Leu Glu Arg Leu Ser Asp Ala Arg Arg Asn Gly His Glu Val Leu | |
| 1235 1240 1245 | |
| gcg gtt gtt cgt ggt agt gcg gtg aat cag gac ggt gcg tcg aat ggt | 3792 |
| Ala Val Val Arg Gly Ser Ala Val Asn Gln Asp Gly Ala Ser Asn Gly | |
| 1250 1255 1260 | |
| ttg acc gcg ccg aat ggt tcg tcg cag cag ccg gtg att gcc cag gca | 3840 |
| Leu Thr Ala Pro Asn Gly Ser Ser Gln Gln Arg Val Ile Ala Gln Ala | |
| 1265 1270 1275 1280 | |
| ttg gcg agt gcg ggg ttg tcg gtg tcc gat gtg gat gct gtg gag gcg | 3888 |
| Leu Ala Ser Ala Gly Leu Ser Val Ser Asp Val Asp Ala Val Glu Ala | |
| 1285 1290 1295 | |
| cat ggg acg ggc acg ccg ctt ggt gat ccg atc gag gcg cag gcg ctg | 3936 |
| His Gly Thr Gly Thr Arg Leu Gly Asp Pro Ile Glu Ala Gln Ala Leu | |
| 1300 1305 1310 | |
| atc gcc acc tac ggc cag ggc ccg ctt ccg gaa ccg cca ttg tgg ttg | 3984 |
| Ile Ala Thr Tyr Gly Gln Gly Arg Leu Pro Glu Arg Pro Leu Trp Leu | |
| 1315 1320 1325 | |
| ggc tcg atg aag tcg aac atc ggt cac gcg cag gca gct gcg ggg ata | 4032 |
| Gly Ser Met Lys Ser Asn Ile Gly His Ala Gln Ala Ala Ala Gly Ile | |
| 1330 1335 1340 | |
| gcc ggc gtc atg aag atg gtg atg gcg atg ccg cac ggg cag cta ccg | 4080 |
| Ala Gly Val Met Lys Met Val Met Ala Met Arg His Gly Gln Leu Pro | |
| 1345 1350 1355 1360 | |
| cgc acg ttg cac gtg gat gag ccg act tct ggg gtg gat tgg tcg gcg | 4128 |
| Arg Thr Leu His Val Asp Glu Pro Thr Ser Gly Val Asp Trp Ser Ala | |
| 1365 1370 1375 | |
| ggg acg gtt caa ctc ctt acg gag aac acg ccc tgg ccc ggg agt ggt | 4176 |
| Gly Thr Val Gln Leu Leu Thr Glu Asn Thr Pro Trp Pro Gly Ser Gly | |
| 1380 1385 1390 | |
| cgt gtt cgt ccg gtg ggg gtg tcg tcg ttc ggg atc agt ggt act aac | 4224 |
| Arg Val Arg Arg Val Gly Val Ser Ser Phe Gly Ile Ser Gly Thr Asn | |
| 1395 1400 1405 | |
| gcg cac gtc atc ctc gaa cag ccc ccg gga gtg ccg agt cag tct gcg | 4272 |
| Ala His Val Ile Leu Glu Gln Pro Pro Gly Val Pro Ser Gln Ser Ala | |
| 1410 1415 1420 | |

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| | |
|---|------|
| ggg ccg ggt tcg ggc tct gtc gtg gat gtt ccg gtg gtg ccg tgg atg Gly Pro Gly Ser Gly Ser Val Val Asp Val Pro Val Val Pro Trp Met 1425 1430 1435 1440 | 4320 |
| gtg tcg ggc aaa aca ccc gaa gcg cta tcc gcg cag gca acg gcg ttg Val Ser Gly Lys Thr Pro Glu Ala Leu Ser Ala Gln Ala Thr Ala Leu 1445 1450 1455 | 4368 |
| atg acc tat ctg gac gag cga cct gat gtc tcc tcg ctg gat gtt ggg Met Thr Tyr Leu Asp Glu Arg Pro Asp Val Ser Ser Leu Asp Val Gly 1460 1465 1470 | 4416 |
| tac tcg ctg gcg ttg aca cgg tcg gcg ctg gat gag cga gcg gtg gtg Tyr Ser Leu Ala Leu Thr Arg Ser Ala Leu Asp Glu Arg Ala Val Val 1475 1480 1485 | 4464 |
| ctg ggg tcg gac cgt gaa acg ttg ttg tgc ggt gtg aaa gcg ctg tct Leu Gly Ser Asp Arg Glu Thr Leu Leu Cys Gly Val Lys Ala Leu Ser 1490 1495 1500 | 4512 |
| gcc ggt cat gag gct tct ggg ttg gtg acc gga tct gtg ggg gct ggg Ala Gly His Glu Ala Ser Gly Leu Val Thr Gly Ser Val Gly Ala Gly 1505 1510 1515 1520 | 4560 |
| ggc cgc atc ggg ttt gtg ttt tcc ggt cag ggt ggt cag tgg ctg ggg Gly Arg Ile Gly Phe Val Phe Ser Gly Gln Gly Gly Gln Trp Leu Gly 1525 1530 1535 | 4608 |
| atg ggc cgg ggg ctt tac cgg gct ttt ccg gtg ttc gct gct gcc ttt Met Gly Arg Gly Leu Tyr Arg Ala Phe Pro Val Phe Ala Ala Ala Phe 1540 1545 1550 | 4656 |
| gac gaa gct tgt gcc gag ctg gat gcg cat ctg ggc cag gaa atc ggg Asp Glu Ala Cys Ala Glu Leu Asp Ala His Leu Gly Gln Glu Ile Gly 1555 1560 1565 | 4704 |
| gtt cgg gag gtg gtg tcc ggt tcg gat gcg cag ttg ctg gat cgg acg Val Arg Glu Val Val Ser Gly Ser Asp Ala Gln Leu Leu Asp Arg Thr 1570 1575 1580 | 4752 |
| ttg tgg gcg cag tcg ggt ttg ttc gcg ttg cag gtg ggc ttg ctg aag Leu Trp Ala Gln Ser Gly Leu Phe Ala Leu Gln Val Gly Leu Leu Lys 1585 1590 1595 1600 | 4800 |
| ttg ctg gat tcg tgg ggg gtt cgg ccg agt gtg gtg ttg ggg cat tcg Leu Leu Asp Ser Trp Gly Val Arg Pro Ser Val Val Leu Gly His Ser 1605 1610 1615 | 4848 |
| gtg ggc gag ttg gcg gcg gcg ttc gcg gcg ggt gtg gtg tcg ttg tcg Val Gly Glu Leu Ala Ala Ala Phe Ala Ala Gly Val Val Ser Leu Ser 1620 1625 1630 | 4896 |
| ggt gcg gct cgg ttg gtg gcg ggt cgt gcc cgg ttg atg cag gcg ttg Gly Ala Ala Arg Leu Val Ala Gly Arg Ala Arg Leu Met Gln Ala Leu 1635 1640 1645 | 4944 |
| ccg tct ggc ggt ggg atg ctg gcg gtg cct gct ggt gag gag ctg ttg Pro Ser Gly Gly Gly Met Leu Ala Val Pro Ala Gly Glu Glu Leu Leu 1650 1655 1660 | 4992 |
| tgg tcg ttg ttg gcc gat cag ggt gat cgt gtg ggg atc gcc gcg gtc Trp Ser Leu Leu Ala Asp Gln Gly Asp Arg Val Gly Ile Ala Ala Val 1665 1670 1675 1680 | 5040 |

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| | |
|---|------|
| aac gct gcg ggg tcg gtg gtg ctc tct ggt gat cgg gat gtg ctc gat | 5088 |
| Asn Ala Ala Gly Ser Val Val Leu Ser Gly Asp Arg Asp Val Leu Asp | |
| 1685 1690 1695 | |
| gac ctt gcc ggt cgg ctg gac ggg caa ggg atc cgg tcg agg tgg ttg | 5136 |
| Asp Leu Ala Gly Arg Leu Asp Gly Gln Gly Ile Arg Ser Arg Trp Leu | |
| 1700 1705 1710 | |
| cgg gtg tcg cat gcg ttt cat tcg tat cgg atg gat ccg atg ctg gcg | 5184 |
| Arg Val Ser His Ala Phe His Ser Tyr Arg Met Asp Pro Met Leu Ala | |
| 1715 1720 1725 | |
| gag ttc gcc gaa ttg gca cga acc gtg gat tac cgg cgt tgt gaa gtg | 5232 |
| Glu Phe Ala Glu Leu Ala Arg Thr Val Asp Tyr Arg Arg Cys Glu Val | |
| 1730 1735 1740 | |
| ccg atc gtg tcg acc ttg acc gga gac ctc gat gac gct ggc agg atg | 5280 |
| Pro Ile Val Ser Thr Leu Thr Gly Asp Leu Asp Ala Gly Arg Met | |
| 1745 1750 1755 1760 | |
| agc ggg ccc gac tac tgg gtg cgt cag gtg cga gag ccg gtc cgc ttc | 5328 |
| Ser Gly Pro Asp Tyr Trp Val Arg Gln Val Arg Glu Pro Val Arg Phe | |
| 1765 1770 1775 | |
| gcc gac ggt gtc cag gcg ctg gtc gag cac gat gtg gcc acc gtt gtc | 5376 |
| Ala Asp Gly Val Gln Ala Leu Val Glu His Asp Val Ala Thr Val Val | |
| 1780 1785 1790 | |
| gag ctc ggt ccg gac ggg gcg ttg tcg gcg ctg atc cag gaa tgt gtc | 5424 |
| Glu Leu Gly Pro Asp Gly Ala Leu Ser Ala Leu Ile Gln Glu Cys Val | |
| 1795 1800 1805 | |
| gcc gca tcc gat cac gcc ggg cgg ctg agc gcg gtc ccg gcg atg cgc | 5472 |
| Ala Ala Ser Asp His Ala Gly Arg Leu Ser Ala Val Pro Ala Met Arg | |
| 1810 1815 1820 | |
| agg aac cag gac gag gcg cag aag gtg atg acg gcc ctg gca cac gtc | 5520 |
| Arg Asn Gln Asp Glu Ala Gln Lys Val Met Thr Ala Leu Ala His Val | |
| 1825 1830 1835 1840 | |
| cac gta cgt ggt ggt gcg gtg gac tgg cgg tcg ttc ttc gcc ggt aca | 5568 |
| His Val Arg Gly Gly Ala Val Asp Trp Arg Ser Phe Phe Ala Gly Thr | |
| 1845 1850 1855 | |
| agg gcg aag caa atc gag ctg ccc acc tac gcc ttc caa cga cag cgg | 5616 |
| Arg Ala Lys Gln Ile Glu Leu Pro Thr Tyr Ala Phe Gln Arg Gln Arg | |
| 1860 1865 1870 | |
| tac tgg ctg aac gcg ctg cgt gaa tct tcc gcc ggc gac atg ggc agg | 5664 |
| Tyr Trp Leu Asn Ala Leu Arg Glu Ser Ser Ala Gly Asp Met Gly Arg | |
| 1875 1880 1885 | |
| cgt gtc gaa gcg aag ttc tgg ggc gcc gtc gag cac gaa gat gtg gaa | 5712 |
| Arg Val Glu Ala Lys Phe Trp Gly Ala Val Glu His Glu Asp Val Glu | |
| 1890 1895 1900 | |
| tcg ctt gca cgc gta ttg ggc att gtg gac gac ggc gct gct gtg gat | 5760 |
| Ser Leu Ala Arg Val Leu Gly Ile Val Asp Asp Gly Ala Ala Val Asp | |
| 1905 1910 1915 1920 | |
| tcc ctg aga agc gcc ctt ccg gtg ttg gcc ggt tgg cag cga acc cgc | 5808 |
| Ser Leu Arg Ser Ala Leu Pro Val Leu Ala Gly Trp Gln Arg Thr Arg | |

| LeA33955-US | | | | | | | | | | | | | | | | |
|-------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| 1925 | | | | | 1930 | | | | | 1935 | | | | | | |
| acc | acc | gag | tcc | att | atg | gat | cag | cgg | tgt | tac | cga | att | ggc | tgg | cgg | 5856 |
| Thr | Thr | Glu | Ser | Ile | Met | Asp | Gln | Arg | Cys | Tyr | Arg | Ile | Gly | Trp | Arg | |
| | | 1940 | | | | | 1945 | | | | | 1950 | | | | |
| cag | gta | gcc | gga | ctc | ccg | ccg | atg | gga | act | gtt | ttc | ggt | acc | tgg | ctg | 5904 |
| Gln | Val | Ala | Gly | Leu | Pro | Pro | Met | Gly | Thr | Val | Phe | Gly | Thr | Trp | Leu | |
| | 1955 | | | | | | 1960 | | | | | 1965 | | | | |
| gtc | ttc | gcg | cct | cat | ggc | tgg | tcc | agc | gaa | ccg | gag | gtg | gtg | gac | tgc | 5952 |
| Val | Phe | Ala | Pro | His | Gly | Trp | Ser | Ser | Glu | Pro | Glu | Val | Val | Asp | Cys | |
| | 1970 | | | | | 1975 | | | | | 1980 | | | | | |
| gtt | acg | gca | ctg | cgg | gca | cgt | ggt | gcc | tcg | gtg | gtg | ttg | gtg | gaa | gct | 6000 |
| Val | Thr | Ala | Leu | Arg | Ala | Arg | Gly | Ala | Ser | Val | Val | Leu | Val | Glu | Ala | |
| | 1985 | | | | 1990 | | | | | 1995 | | | | | 2000 | |
| gat | ccc | gac | ccg | acc | tcc | ttc | ggc | gac | cgg | gta | cga | acc | ctg | tgt | tcg | 6048 |
| Asp | Pro | Asp | Pro | Thr | Ser | Phe | Gly | Asp | Arg | Val | Arg | Thr | Leu | Cys | Ser | |
| | | | | 2005 | | | | | 2010 | | | | | 2015 | | |
| ggc | ctt | ccg | gat | ctt | gtt | ggc | gtg | ttg | tca | atg | ttg | tgc | ttg | gaa | gaa | 6096 |
| Gly | Leu | Pro | Asp | Leu | Val | Gly | Val | Leu | Ser | Met | Leu | Cys | Leu | Glu | Glu | |
| | | | 2020 | | | | | 2025 | | | | | 2030 | | | |
| tcg | gtc | ctt | ccg | gga | ttt | tct | gcg | gtg | tca | cgg | ggt | ttt | gcg | ttg | acc | 6144 |
| Ser | Val | Leu | Pro | Gly | Phe | Ser | Ala | Val | Ser | Arg | Gly | Phe | Ala | Leu | Thr | |
| | | 2035 | | | | | 2040 | | | | | 2045 | | | | |
| gtg | gag | ttg | gtg | cgg | gtt | ttg | cgg | gca | gct | ggt | gcg | act | gcc | cgg | ttg | 6192 |
| Val | Glu | Leu | Val | Arg | Val | Leu | Arg | Ala | Ala | Gly | Ala | Thr | Ala | Arg | Leu | |
| | 2050 | | | | | 2055 | | | | | 2060 | | | | | |
| tgg | ttg | ctg | acg | tgt | ggt | ggc | gtg | tcg | gtg | gga | gat | gta | ccg | gtt | cgt | 6240 |
| Trp | Leu | Leu | Thr | Cys | Gly | Gly | Val | Ser | Val | Gly | Asp | Val | Pro | Val | Arg | |
| | 2065 | | | | 2070 | | | | | 2075 | | | | | 2080 | |
| cca | gcg | cag | gcc | ctg | gcg | tgg | ggg | ttg | ggg | cgt | gtt | gtg | ggg | ttg | gag | 6288 |
| Pro | Ala | Gln | Ala | Leu | Ala | Trp | Gly | Leu | Gly | Arg | Val | Val | Gly | Leu | Glu | |
| | | | 2085 | | | | | | 2090 | | | | | 2095 | | |
| cat | ccg | gac | tgg | tgg | ggc | ggc | ttg | atc | gat | att | ccg | gtc | ttg | ttc | gac | 6336 |
| His | Pro | Asp | Trp | Trp | Gly | Gly | Leu | Ile | Asp | Ile | Pro | Val | Leu | Phe | Asp | |
| | | | 2100 | | | | | 2105 | | | | | 2110 | | | |
| gaa | gac | gct | caa | gag | cgg | ttg | tcg | att | gtg | ctg | gca | ggt | ctc | gat | gag | 6384 |
| Glu | Asp | Ala | Gln | Glu | Arg | Leu | Ser | Ile | Val | Leu | Ala | Gly | Leu | Asp | Glu | |
| | | 2115 | | | | | 2120 | | | | | 2125 | | | | |
| gac | gag | gtc | gcg | atc | cgt | cct | gac | ggc | atg | ttc | gcg | cgt | cgg | ttg | gta | 6432 |
| Asp | Glu | Val | Ala | Ile | Arg | Pro | Asp | Gly | Met | Phe | Ala | Arg | Arg | Leu | Val | |
| | 2130 | | | | | 2135 | | | | | 2140 | | | | | |
| cgc | cac | act | gtc | tca | gct | gat | gtg | aag | aag | gcg | tgg | cgc | ccc | agg | gga | 6480 |
| Arg | His | Thr | Val | Ser | Ala | Asp | Val | Lys | Lys | Ala | Trp | Arg | Pro | Arg | Gly | |
| | 2145 | | | | 2150 | | | | | 2155 | | | | | 2160 | |
| tcg | gtg | ctg | gtg | acg | ggc | ggc | acg | ggt | ggt | ttg | ggg | gcg | cac | gtt | gct | 6528 |
| Ser | Val | Leu | Val | Thr | Gly | Gly | Thr | Gly | Gly | Leu | Gly | Ala | His | Val | Ala | |
| | | | | 2165 | | | | | 2170 | | | | | 2175 | | |
| cgc | tgg | ctg | gcc | gac | gcc | gga | gcc | gaa | cat | gtg | gcg | atg | gtg | agt | cga | 6576 |

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| | | | | | | | | | | | | | | | | |
|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| Arg | Trp | Leu | Ala | Asp | Ala | Gly | Ala | Glu | His | Val | Ala | Met | Val | Ser | Arg | |
| | | 2180 | | | | | | 2185 | | | | | 2190 | | | |
| cgc | ggc | gag | cag | gca | ccg | agt | gct | gag | aag | ttg | cgg | acg | gaa | ctg | gag | 6624 |
| Arg | Gly | Glu | Gln | Ala | Pro | Ser | Ala | Glu | Lys | Leu | Arg | Thr | Glu | Leu | Glu | |
| | 2195 | | | | | 2200 | | | | | 2205 | | | | | |
| gat | ctg | ggt | acc | cgg | gtg | tcg | atc | gtg | tca | tgc | gat | gtg | acc | gat | cgc | 6672 |
| Asp | Leu | Gly | Thr | Arg | Val | Ser | Ile | Val | Ser | Cys | Asp | Val | Thr | Asp | Arg | |
| | 2210 | | | | 2215 | | | | | 2220 | | | | | | |
| gag | gcg | ctc | gcc | gaa | gtg | ctg | aaa | gcc | ctt | ccg | gct | gaa | aac | ccg | ttg | 6720 |
| Glu | Ala | Leu | Ala | Glu | Val | Leu | Lys | Ala | Leu | Pro | Ala | Glu | Asn | Pro | Leu | |
| 2225 | | | | 2230 | | | | 2235 | | | | | | | 2240 | |
| acc | gcg | gta | gtg | cat | gcg | gca | ggc | gtg | atc | gag | act | ggt | gat | gcg | gcg | 6768 |
| Thr | Ala | Val | Val | His | Ala | Ala | Gly | Val | Ile | Glu | Thr | Gly | Asp | Ala | Ala | |
| | | | 2245 | | | | | 2250 | | | | | 2255 | | | |
| gca | atg | agc | ctg | gct | gat | ttc | gat | cac | gtg | ttg | tcc | gca | aag | gtg | gcc | 6816 |
| Ala | Met | Ser | Leu | Ala | Asp | Phe | Asp | His | Val | Leu | Ser | Ala | Lys | Val | Ala | |
| | | 2260 | | | | | 2265 | | | | | 2270 | | | | |
| ggt | gcc | gcg | aat | ctg | gat | gcc | ttg | ttg | gcc | gat | gtg | gaa | ttg | gac | gcg | 6864 |
| Gly | Ala | Ala | Asn | Leu | Asp | Ala | Leu | Leu | Ala | Asp | Val | Glu | Leu | Asp | Ala | |
| | 2275 | | | | | 2280 | | | | | 2285 | | | | | |
| ttc | gtc | ttg | ttc | tca | tcg | gtg | tca | gga | gtt | tgg | ggc | gct | ggg | gga | cac | 6912 |
| Phe | Val | Leu | Phe | Ser | Ser | Val | Ser | Gly | Val | Trp | Gly | Ala | Gly | Gly | His | |
| | 2290 | | | | | 2295 | | | | 2300 | | | | | | |
| ggg | gct | tac | gca | gcg | gcg | aat | gcc | tat | ctg | gat | gcg | ctc | gcg | gaa | cag | 6960 |
| Gly | Ala | Tyr | Ala | Ala | Ala | Asn | Ala | Tyr | Leu | Asp | Ala | Leu | Ala | Glu | Gln | |
| 2305 | | | | 2310 | | | | | 2315 | | | | | 2320 | | |
| cgt | cgg | tcg | cga | ggg | ctg | gtc | gcg | act | gcg | gtg | gcc | tgg | ggg | ccg | tgg | 7008 |
| Arg | Arg | Ser | Arg | Gly | Leu | Val | Ala | Thr | Ala | Val | Ala | Trp | Gly | Pro | Trp | |
| | | | 2325 | | | | | 2330 | | | | 2335 | | | | |
| gcc | ggc | gag | ggc | atg | gcc | tcc | gga | gaa | aca | gga | gac | cag | ctg | cgc | cga | 7056 |
| Ala | Gly | Glu | Gly | Met | Ala | Ser | Gly | Glu | Thr | Gly | Asp | Gln | Leu | Arg | Arg | |
| | | 2340 | | | | | 2345 | | | | | 2350 | | | | |
| tac | ggc | ctt | tcc | cca | atg | gct | ccg | cag | cac | gcc | atc | gcc | gga | atc | cgg | 7104 |
| Tyr | Gly | Leu | Ser | Pro | Met | Ala | Pro | Gln | His | Ala | Ile | Ala | Gly | Ile | Arg | |
| | 2355 | | | | | 2360 | | | | | 2365 | | | | | |
| cag | gcc | gtg | gaa | cag | gac | gaa | att | tcc | ctg | gta | gtg | gcc | gat | gtc | gat | 7152 |
| Gln | Ala | Val | Glu | Gln | Asp | Glu | Ile | Ser | Leu | Val | Val | Ala | Asp | Val | Asp | |
| | 2370 | | | | 2375 | | | | | 2380 | | | | | | |
| tgg | gca | cgt | ttc | agc | gcg | gga | ttg | ctg | gcg | gct | agg | ccg | cgg | ccg | ctg | 7200 |
| Trp | Ala | Arg | Phe | Ser | Ala | Gly | Leu | Leu | Ala | Ala | Arg | Pro | Arg | Pro | Leu | |
| 2385 | | | | 2390 | | | | 2395 | | | | | | | 2400 | |
| ctg | aac | gaa | ctg | gcc | gag | gtc | aag | gaa | ctc | ctc | gtc | gat | gcc | cag | ccc | 7248 |
| Leu | Asn | Glu | Leu | Ala | Glu | Val | Lys | Glu | Leu | Leu | Val | Asp | Ala | Gln | Pro | |
| | | | 2405 | | | | | 2410 | | | | | 2415 | | | |
| gag | gcg | gga | gtc | ctt | gcc | gac | gcg | tcg | ttg | gaa | tgg | cgg | cag | cga | ttg | 7296 |
| Glu | Ala | Gly | Val | Leu | Ala | Asp | Ala | Ser | Leu | Glu | Trp | Arg | Gln | Arg | Leu | |
| | | 2420 | | | | | 2425 | | | | | 2430 | | | | |

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| | |
|---|------|
| tcc gcg gca ccg agg ccg aca cag gaa cag ctg atc ctg gag ctg gta Ser Ala Ala Pro Arg Pro Thr Gln Glu Gln Leu Ile Leu Glu Leu Val 2435 2440 2445 | 7344 |
| cgc ggc gaa acc gct ctg gtg ctg gga cac ccc ggg gca gcg gcc gtt Arg Gly Glu Thr Ala Leu Val Leu Gly His Pro Gly Ala Ala Ala Val 2450 2455 2460 | 7392 |
| gca tcg gaa cga gcc ttc aag gac agc gga ttc gac tcg cag gcc gcg Ala Ser Glu Arg Ala Phe Lys Asp Ser Gly Phe Asp Ser Gln Ala Ala 2465 2470 2475 2480 | 7440 |
| gtc gaa ctc cgc gtt cgg ctc aat cga gct acc ggc ctc cag ttg cca Val Glu Leu Arg Val Arg Leu Asn Arg Ala Thr Gly Leu Gln Leu Pro 2485 2490 2495 | 7488 |
| tcg aca att atc ttc agc cat ccc acg cct gcg gaa ctg gct gcg gag Ser Thr Ile Ile Phe Ser His Pro Thr Pro Ala Glu Leu Ala Ala Glu 2500 2505 2510 | 7536 |
| ctg cgg gcg agg ctt ctt ccc gag tcc gca gga gca ggc att ccc gag Leu Arg Ala Arg Leu Leu Pro Glu Ser Ala Gly Ala Gly Ile Pro Glu 2515 2520 2525 | 7584 |
| gag gac gag gcg cga atc aga gcg gca ctg acg tcg atc ccg ttc ccg Glu Asp Glu Ala Arg Ile Arg Ala Ala Leu Thr Ser Ile Pro Phe Pro 2530 2535 2540 | 7632 |
| gcc ttg cgc gag gca ggc ttg gtg agt ccg ctg ctc gca ctt gcc gga Ala Leu Arg Glu Ala Gly Leu Val Ser Pro Leu Leu Ala Leu Ala Gly 2545 2550 2555 2560 | 7680 |
| cac ccg gtc gac tcc ggt atc tcc tcg gac gat gcg gcc gcg acc tcg His Pro Val Asp Ser Gly Ile Ser Ser Ser Asp Asp Ala Ala Ala Thr Ser 2565 2570 2575 | 7728 |
| atc gat gcg atg gat gta gcc ggc ctc gtc gaa gca gcg ctg ggc gaa Ile Asp Ala Met Asp Val Ala Gly Leu Val Glu Ala Ala Leu Gly Glu 2580 2585 2590 | 7776 |
| cgc gag tcc tga Arg Glu Ser 2595 | 7788 |

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 <212> PRT
 <213> Saccharopolyspora spinosa

<400> 42
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 Leu Pro Gln Ala Pro Asp Pro Ala Ser Phe Trp Arg Leu Leu Arg Thr
 20 25 30
 Gly Thr Asp Ala Ile Thr Thr Val Pro Glu Gly Arg Trp Gly Asp Pro
 35 40 45
 Leu Pro Gly Arg Asp Ala Pro Lys Gly Pro Glu Trp Gly Gly Phe Leu
 50 55 60

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| | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Ala | Asp | Val | Asp | Cys | Phe | Asp | Pro | Glu | Phe | Phe | Gly | Ile | Ser | Pro | Arg |
| 65 | | | | | 70 | | | | | 75 | | | | | 80 |
| Glu | Ala | Ala | Ala | Val | Asp | Pro | Gln | Gln | Arg | Leu | Ala | Leu | Glu | Leu | Ala |
| | | | | 85 | | | | | 90 | | | | | 95 | |
| Trp | Glu | Ala | Leu | Glu | Asp | Ala | Gly | Ile | Pro | Ala | Gly | Glu | Leu | Arg | Gly |
| | | | 100 | | | | | 105 | | | | | 110 | | |
| Thr | Ala | Ala | Gly | Val | Phe | Met | Gly | Ala | Ile | Ser | Asp | Asp | Tyr | Ala | Ala |
| | | 115 | | | | | 120 | | | | | 125 | | | |
| Leu | Leu | Arg | Glu | Ser | Pro | Pro | Glu | Val | Ala | Ala | Gln | Tyr | Arg | Leu | Thr |
| | 130 | | | | | 135 | | | | | 140 | | | | |
| Gly | Thr | His | Arg | Ser | Leu | Ile | Ala | Asn | Arg | Val | Ser | Tyr | Val | Leu | Gly |
| 145 | | | | | 150 | | | | | 155 | | | | | 160 |
| Leu | Arg | Gly | Pro | Ser | Leu | Thr | Val | Asp | Ser | Gly | Gln | Ser | Ser | Ser | Leu |
| | | | | 165 | | | | | 170 | | | | | 175 | |
| Val | Gly | Val | His | Leu | Ala | Ser | Glu | Ser | Leu | Arg | Arg | Gly | Glu | Cys | Thr |
| | | | 180 | | | | | 185 | | | | | 190 | | |
| Ile | Ala | Leu | Ala | Gly | Gly | Val | Asn | Leu | Asn | Leu | Ala | Ala | Glu | Ser | Asn |
| | | 195 | | | | | 200 | | | | | 205 | | | |
| Ser | Ala | Leu | Met | Asp | Phe | Gly | Ala | Leu | Ser | Pro | Asp | Gly | Arg | Cys | Phe |
| | 210 | | | | | 215 | | | | | 220 | | | | |
| Thr | Phe | Asp | Val | Arg | Ala | Asn | Gly | Tyr | Val | Arg | Gly | Glu | Gly | Gly | Gly |
| 225 | | | | | 230 | | | | | 235 | | | | | 240 |
| Leu | Val | Val | Leu | Lys | Lys | Ala | Asp | Gln | Ala | His | Ala | Asp | Gly | Asp | Arg |
| | | | | 245 | | | | | 250 | | | | | 255 | |
| Ile | Tyr | Cys | Leu | Ile | Arg | Gly | Ser | Ala | Val | Asn | Asn | Asp | Gly | Gly | Gly |
| | | | 260 | | | | | 265 | | | | | 270 | | |
| Ala | Gly | Leu | Thr | Val | Pro | Ala | Ala | Asp | Ala | Gln | Ala | Glu | Leu | Leu | Arg |
| | | 275 | | | | | 280 | | | | | 285 | | | |
| Gln | Ala | Tyr | Arg | Asn | Ala | Gly | Val | Asp | Pro | Ala | Ala | Val | Gln | Tyr | Val |
| | 290 | | | | | 295 | | | | | 300 | | | | |
| Glu | Leu | His | Gly | Ser | Ala | Thr | Arg | Val | Gly | Asp | Pro | Val | Glu | Ala | Ala |
| 305 | | | | | 310 | | | | | 315 | | | | | 320 |
| Ala | Leu | Gly | Ala | Val | Leu | Gly | Ala | Ala | Arg | Arg | Pro | Gly | Asp | Glu | Leu |
| | | | | 325 | | | | | 330 | | | | | 335 | |
| Arg | Val | Gly | Ser | Ala | Lys | Thr | Asn | Val | Gly | His | Leu | Glu | Ala | Ala | Ala |
| | | | 340 | | | | | 345 | | | | | 350 | | |
| Gly | Val | Thr | Gly | Leu | Leu | Lys | Thr | Ala | Leu | Ser | Ile | Trp | His | Arg | Glu |
| | | 355 | | | | | 360 | | | | | 365 | | | |
| Leu | Pro | Pro | Ser | Leu | His | Phe | Thr | Ala | Pro | Asn | Pro | Glu | Ile | Pro | Leu |
| | 370 | | | | | 375 | | | | | 380 | | | | |
| Asp | Glu | Leu | Asn | Leu | Arg | Val | Gln | Arg | Asp | Leu | Arg | Pro | Trp | Pro | Glu |
| 385 | | | | | 390 | | | | | 395 | | | | | 400 |

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| | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Ser | Glu | Gly | Pro | Leu | Leu | Ala | Gly | Val | Ser | Ala | Phe | Gly | Met | Gly | Gly |
| | | | | 405 | | | | | 410 | | | | | 415 | |
| Thr | Asn | Cys | His | Leu | Val | Leu | Ser | Gly | Thr | Ser | Arg | Val | Glu | Arg | Arg |
| | | | 420 | | | | | 425 | | | | | 430 | | |
| Arg | Ser | Gly | Pro | Ala | Glu | Ala | Thr | Met | Pro | Trp | Val | Leu | Ser | Ala | Arg |
| | | 435 | | | | | 440 | | | | | 445 | | | |
| Thr | Pro | Val | Ala | Leu | Arg | Ala | Gln | Ala | Ala | Arg | Leu | His | Thr | His | Leu |
| | 450 | | | | | 455 | | | | | 460 | | | | |
| Asn | Thr | Ala | Gly | Gln | Ser | Pro | Leu | Asp | Val | Ala | Tyr | Ser | Leu | Ala | Thr |
| 465 | | | | | 470 | | | | | 475 | | | | | 480 |
| Thr | Arg | Ser | Ala | Leu | Pro | His | Arg | Ala | Ala | Leu | Val | Ala | Asp | Asp | Glu |
| | | | | 485 | | | | | 490 | | | | | 495 | |
| Pro | Lys | Leu | Leu | Ala | Gly | Leu | Lys | Ala | Leu | Ala | Asp | Gly | Asp | Asp | Ala |
| | | | 500 | | | | | 505 | | | | | 510 | | |
| Pro | Thr | Leu | Cys | His | Gly | Ala | Thr | Ser | Gly | Glu | Arg | Ala | Ala | Val | Phe |
| | | 515 | | | | | 520 | | | | | 525 | | | |
| Val | Phe | Pro | Gly | Gln | Gly | Ser | Gln | Trp | Ile | Gly | Met | Gly | Arg | Gln | Leu |
| | 530 | | | | | 535 | | | | | 540 | | | | |
| Leu | Glu | Thr | Ser | Glu | Val | Phe | Ala | Ala | Ser | Met | Ser | Asp | Cys | Ala | Asp |
| 545 | | | | | 550 | | | | | 555 | | | | | 560 |
| Ala | Leu | Ala | Pro | His | Leu | Asp | Trp | Ser | Leu | Leu | Asp | Val | Leu | Arg | Asn |
| | | | | 565 | | | | | 570 | | | | | 575 | |
| Ala | Ala | Gly | Ala | Ala | His | Leu | Asp | His | Asp | Asp | Val | Val | Gln | Pro | Ala |
| | | | 580 | | | | | 585 | | | | | 590 | | |
| Leu | Phe | Ala | Ile | Met | Val | Ser | Leu | Ala | Glu | Leu | Trp | Arg | Ser | Trp | Gly |
| | | 595 | | | | | 600 | | | | | 605 | | | |
| Val | Arg | Pro | Val | Ala | Val | Val | Gly | His | Ser | Gln | Gly | Glu | Ile | Ala | Ala |
| | 610 | | | | | 615 | | | | | 620 | | | | |
| Ala | Cys | Val | Ala | Gly | Ala | Leu | Ser | Val | Arg | Asp | Ala | Ala | Arg | Val | Val |
| 625 | | | | | 630 | | | | | 635 | | | | | 640 |
| Ala | Val | Arg | Ser | Arg | Leu | Leu | Thr | Ala | Leu | Ala | Gly | Ser | Gly | Ala | Met |
| | | | | 645 | | | | | 650 | | | | | 655 | |
| Ala | Ser | Leu | Gln | His | Pro | Ala | Glu | Glu | Val | Arg | Gln | Ile | Leu | Leu | Pro |
| | | | 660 | | | | | 665 | | | | | 670 | | |
| Trp | Arg | Asp | Arg | Ile | Gly | Val | Ala | Gly | Val | Asn | Gly | Pro | Ser | Ser | Thr |
| | | 675 | | | | 680 | | | | | | 685 | | | |
| Leu | Val | Ser | Gly | Asp | Arg | Glu | Ala | Met | Ala | Glu | Leu | Leu | Ala | Glu | Cys |
| | 690 | | | | | 695 | | | | | 700 | | | | |
| Ala | Asp | Arg | Glu | Leu | Arg | Met | Arg | Arg | Ile | Pro | Val | Glu | Tyr | Ala | Ser |
| 705 | | | | | 710 | | | | | 715 | | | | | 720 |
| His | Ser | Pro | His | Ile | Glu | Val | Val | Arg | Asp | Glu | Leu | Leu | Gly | Leu | Leu |
| | | | | 725 | | | | | 730 | | | | | 735 | |

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| | | | | | | | | | | | | | | | |
|-----|------|-----|------|------|------|------|------|------|------|------|------|------|------|------|------|
| Ala | Pro | Val | Glu | Pro | Arg | Thr | Gly | Ser | Ile | Pro | Ile | Tyr | Ser | Thr | Thr |
| | | | 740 | | | | | 745 | | | | | 750 | | |
| Thr | Gly | Asp | Leu | Leu | Asp | Arg | Pro | Met | Asp | Ala | Asp | Tyr | Trp | Tyr | Arg |
| | | 755 | | | | | 760 | | | | | 765 | | | |
| Asn | Leu | Arg | Gln | Pro | Val | Leu | Phe | Glu | Ala | Ala | Val | Glu | Ala | Leu | Leu |
| | 770 | | | | | 775 | | | | | 780 | | | | |
| Lys | Arg | Gly | Tyr | Asp | Ala | Phe | Ile | Glu | Ile | Ser | Pro | His | Pro | Val | Leu |
| 785 | | | | | 790 | | | | | 795 | | | | | 800 |
| Thr | Ala | Asn | Ile | Gln | Glu | Thr | Ala | Val | Arg | Ala | Gly | Arg | Glu | Val | Val |
| | | | | 805 | | | | | 810 | | | | | 815 | |
| Ala | Leu | Gly | Thr | Leu | Arg | Arg | Gly | Glu | Gly | Gly | Met | Arg | Gln | Ala | Leu |
| | | | 820 | | | | | 825 | | | | | 830 | | |
| Thr | Ser | Leu | Ala | Arg | Ala | His | Val | His | Gly | Val | Ala | Ala | Asp | Trp | His |
| | | 835 | | | | | 840 | | | | | 845 | | | |
| Ala | Val | Phe | Ala | Gly | Thr | Gly | Ala | Gln | Arg | Val | Asp | Leu | Pro | Thr | Tyr |
| | 850 | | | | | 855 | | | | | 860 | | | | |
| Ala | Phe | Gln | Arg | Gln | Arg | Tyr | Trp | Leu | Asp | Ala | Lys | Leu | Pro | Asp | Val |
| 865 | | | | | 870 | | | | | 875 | | | | | 880 |
| Ala | Met | Pro | Glu | Ser | Asp | Val | Ser | Thr | Ala | Leu | Arg | Glu | Lys | Leu | Arg |
| | | | | 885 | | | | | 890 | | | | | 895 | |
| Ser | Ser | Pro | Arg | Ala | Asp | Val | Asp | Ser | Thr | Thr | Leu | Thr | Met | Ile | Arg |
| | | | 900 | | | | | 905 | | | | | 910 | | |
| Ala | Gln | Ala | Ala | Val | Val | Leu | Gly | His | Ser | Asp | Pro | Lys | Glu | Val | Asp |
| | | 915 | | | | | 920 | | | | | 925 | | | |
| Pro | Asp | Arg | Thr | Phe | Lys | Asp | Leu | Gly | Phe | Asp | Ser | Ser | Met | Val | Val |
| | 930 | | | | | 935 | | | | | 940 | | | | |
| Glu | Leu | Cys | Asp | Arg | Leu | Asn | Ala | Ala | Thr | Gly | Leu | Arg | Leu | Ala | Pro |
| 945 | | | | | 950 | | | | | 955 | | | | | 960 |
| Ser | Val | Val | Phe | Asp | Cys | Pro | Thr | Pro | Asp | Lys | Leu | Ala | Arg | Gln | Val |
| | | | | 965 | | | | | 970 | | | | | 975 | |
| Arg | Thr | Leu | Leu | Leu | Gly | Glu | Pro | Ala | Pro | Met | Thr | Ser | His | Arg | Pro |
| | | 980 | | | | | | 985 | | | | | 990 | | |
| Asp | Ser | Asp | Ala | Asp | Glu | Pro | Ile | Ala | Val | Ile | Gly | Met | Gly | Cys | Arg |
| | | 995 | | | | | 1000 | | | | | 1005 | | | |
| Phe | Pro | Gly | Gly | Val | Ser | Ser | Pro | Glu | Glu | Leu | Trp | Gln | Leu | Val | Ala |
| | 1010 | | | | | 1015 | | | | | 1020 | | | | |
| Ala | Gly | Arg | Asp | Val | Val | Ser | Glu | Phe | Pro | Ala | Asp | Arg | Gly | Trp | Asp |
| 025 | | | | | 1030 | | | | | 1035 | | | | | 1040 |
| Leu | Glu | Arg | Ala | Gly | Thr | Ser | His | Val | Arg | Ala | Gly | Gly | Phe | Leu | His |
| | | | | 1045 | | | | | 1050 | | | | | 1055 | |
| Gly | Ala | Pro | Asp | Phe | Asp | Pro | Gly | Phe | Phe | Arg | Ile | Ser | Pro | Arg | Glu |
| | | | 1060 | | | | | 1065 | | | | | 1070 | | |

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Ala Leu Ala Met Asp Pro Gln Gln Arg Leu Leu Leu Glu Ile Ala Trp
1075 1080 1085

Glu Ala Val Glu Arg Gly Gly Ile Asn Pro Gln His Leu His Gly Ser
1090 1095 1100

Gln Thr Gly Val Phe Val Gly Ala Thr Ser Leu Asp Tyr Gly Pro Arg
1105 1110 1115 1120

Leu His Glu Ala Ser Glu Glu Ala Ala Gly Tyr Val Leu Thr Gly Ser
1125 1130 1135

Thr Thr Ser Val Ala Ser Gly Arg Val Ala Tyr Ser Phe Gly Phe Glu
1140 1145 1150

Gly Pro Ala Val Thr Val Asp Thr Ala Cys Ser Ser Ser Leu Val Ala
1155 1160 1165

Leu His Leu Ala Cys Gln Ser Leu Arg Ser Gly Glu Cys Asp Leu Ala
1170 1175 1180

Leu Ala Gly Gly Val Thr Val Met Ala Thr Pro Gly Met Phe Val Glu
1185 1190 1195 1200

Phe Ser Arg Gln Arg Gly Leu Ala Pro Asp Gly Arg Cys Lys Ser Phe
1205 1210 1215

Ala Glu Ala Ala Asp Gly Thr Gly Trp Ser Glu Gly Ala Gly Leu Val
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Leu Leu Glu Arg Leu Ser Asp Ala Arg Arg Asn Gly His Glu Val Leu
1235 1240 1245

Ala Val Val Arg Gly Ser Ala Val Asn Gln Asp Gly Ala Ser Asn Gly
1250 1255 1260

Leu Thr Ala Pro Asn Gly Ser Ser Gln Gln Arg Val Ile Ala Gln Ala
1265 1270 1275 1280

Leu Ala Ser Ala Gly Leu Ser Val Ser Asp Val Asp Ala Val Glu Ala
1285 1290 1295

His Gly Thr Gly Thr Arg Leu Gly Asp Pro Ile Glu Ala Gln Ala Leu
1300 1305 1310

Ile Ala Thr Tyr Gly Gln Gly Arg Leu Pro Glu Arg Pro Leu Trp Leu
1315 1320 1325

Gly Ser Met Lys Ser Asn Ile Gly His Ala Gln Ala Ala Ala Gly Ile
1330 1335 1340

Ala Gly Val Met Lys Met Val Met Ala Met Arg His Gly Gln Leu Pro
1345 1350 1355 1360

Arg Thr Leu His Val Asp Glu Pro Thr Ser Gly Val Asp Trp Ser Ala
1365 1370 1375

Gly Thr Val Gln Leu Leu Thr Glu Asn Thr Pro Trp Pro Gly Ser Gly
1380 1385 1390

Arg Val Arg Arg Val Gly Val Ser Ser Phe Gly Ile Ser Gly Thr Asn
1395 1400 1405

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Gly Pro Gly Ser Gly Ser Val Val Asp Val Pro Val Val Pro Trp Met
425 1430 1435 1440

Val Ser Gly Lys Thr Pro Glu Ala Leu Ser Ala Gln Ala Thr Ala Leu
1445 1450 1455

Met Thr Tyr Leu Asp Glu Arg Pro Asp Val Ser Ser Leu Asp Val Gly
1460 1465 1470

Tyr Ser Leu Ala Leu Thr Arg Ser Ala Leu Asp Glu Arg Ala Val Val
1475 1480 1485

Leu Gly Ser Asp Arg Glu Thr Leu Leu Cys Gly Val Lys Ala Leu Ser
1490 1495 1500

Ala Gly His Glu Ala Ser Gly Leu Val Thr Gly Ser Val Gly Ala Gly
505 1510 1515 1520

Gly Arg Ile Gly Phe Val Phe Ser Gly Gln Gly Gly Gln Trp Leu Gly
1525 1530 1535

Met Gly Arg Gly Leu Tyr Arg Ala Phe Pro Val Phe Ala Ala Ala Phe
1540 1545 1550

Asp Glu Ala Cys Ala Glu Leu Asp Ala His Leu Gly Gln Glu Ile Gly
1555 1560 1565

Val Arg Glu Val Val Ser Gly Ser Asp Ala Gln Leu Leu Asp Arg Thr
1570 1575 1580

Leu Trp Ala Gln Ser Gly Leu Phe Ala Leu Gln Val Gly Leu Leu Lys
585 1590 1595 1600

Leu Leu Asp Ser Trp Gly Val Arg Pro Ser Val Val Leu Gly His Ser
1605 1610 1615

Val Gly Glu Leu Ala Ala Ala Phe Ala Ala Gly Val Val Ser Leu Ser
1620 1625 1630

Gly Ala Ala Arg Leu Val Ala Gly Arg Ala Arg Leu Met Gln Ala Leu
1635 1640 1645

Pro Ser Gly Gly Gly Met Leu Ala Val Pro Ala Gly Glu Glu Leu Leu
1650 1655 1660

Trp Ser Leu Leu Ala Asp Gln Gly Asp Arg Val Gly Ile Ala Ala Val
665 1670 1675 1680

Asn Ala Ala Gly Ser Val Val Leu Ser Gly Asp Arg Asp Val Leu Asp
1685 1690 1695

Asp Leu Ala Gly Arg Leu Asp Gly Gln Gly Ile Arg Ser Arg Trp Leu
1700 1705 1710

Arg Val Ser His Ala Phe His Ser Tyr Arg Met Asp Pro Met Leu Ala
1715 1720 1725

Glu Phe Ala Glu Leu Ala Arg Thr Val Asp Tyr Arg Arg Cys Glu Val
1730 1735 1740

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Pro Ile Val Ser Thr Leu Thr Gly Asp Leu Asp Asp Ala Gly Arg Met
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 Ser Gly Pro Asp Tyr Trp Val Arg Gln Val Arg Glu Pro Val Arg Phe
 1765 1770 1775
 Ala Asp Gly Val Gln Ala Leu Val Glu His Asp Val Ala Thr Val Val
 1780 1785 1790
 Glu Leu Gly Pro Asp Gly Ala Leu Ser Ala Leu Ile Gln Glu Cys Val
 1795 1800 1805
 Ala Ala Ser Asp His Ala Gly Arg Leu Ser Ala Val Pro Ala Met Arg
 1810 1815 1820
 Arg Asn Gln Asp Glu Ala Gln Lys Val Met Thr Ala Leu Ala His Val
 825 1830 1835 1840
 His Val Arg Gly Gly Ala Val Asp Trp Arg Ser Phe Phe Ala Gly Thr
 1845 1850 1855
 Arg Ala Lys Gln Ile Glu Leu Pro Thr Tyr Ala Phe Gln Arg Gln Arg
 1860 1865 1870
 Tyr Trp Leu Asn Ala Leu Arg Glu Ser Ser Ala Gly Asp Met Gly Arg
 1875 1880 1885
 Arg Val Glu Ala Lys Phe Trp Gly Ala Val Glu His Glu Asp Val Glu
 1890 1895 1900
 Ser Leu Ala Arg Val Leu Gly Ile Val Asp Asp Gly Ala Ala Val Asp
 905 1910 1915 1920
 Ser Leu Arg Ser Ala Leu Pro Val Leu Ala Gly Trp Gln Arg Thr Arg
 1925 1930 1935
 Thr Thr Glu Ser Ile Met Asp Gln Arg Cys Tyr Arg Ile Gly Trp Arg
 1940 1945 1950
 Gln Val Ala Gly Leu Pro Pro Met Gly Thr Val Phe Gly Thr Trp Leu
 1955 1960 1965
 Val Phe Ala Pro His Gly Trp Ser Ser Glu Pro Glu Val Val Asp Cys
 1970 1975 1980
 Val Thr Ala Leu Arg Ala Arg Gly Ala Ser Val Val Leu Val Glu Ala
 985 1990 1995 2000
 Asp Pro Asp Pro Thr Ser Phe Gly Asp Arg Val Arg Thr Leu Cys Ser
 2005 2010 2015
 Gly Leu Pro Asp Leu Val Gly Val Leu Ser Met Leu Cys Leu Glu Glu
 2020 2025 2030
 Ser Val Leu Pro Gly Phe Ser Ala Val Ser Arg Gly Phe Ala Leu Thr
 2035 2040 2045
 Val Glu Leu Val Arg Val Leu Arg Ala Ala Gly Ala Thr Ala Arg Leu
 2050 2055 2060
 Trp Leu Leu Thr Cys Gly Gly Val Ser Val Gly Asp Val Pro Val Arg
 065 2070 2075 2080

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Pro Ala Gln Ala Leu Ala Trp Gly Leu Gly Arg Val Val Gly Leu Glu
2085 2090 2095

His Pro Asp Trp Trp Gly Gly Leu Ile Asp Ile Pro Val Leu Phe Asp
2100 2105 2110

Glu Asp Ala Gln Glu Arg Leu Ser Ile Val Leu Ala Gly Leu Asp Glu
2115 2120 2125

Asp Glu Val Ala Ile Arg Pro Asp Gly Met Phe Ala Arg Arg Leu Val
2130 2135 2140

Arg His Thr Val Ser Ala Asp Val Lys Lys Ala Trp Arg Pro Arg Gly
145 2150 2155 2160

Ser Val Leu Val Thr Gly Gly Thr Gly Gly Leu Gly Ala His Val Ala
2165 2170 2175

Arg Trp Leu Ala Asp Ala Gly Ala Glu His Val Ala Met Val Ser Arg
2180 2185 2190

Arg Gly Glu Gln Ala Pro Ser Ala Glu Lys Leu Arg Thr Glu Leu Glu
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Asp Leu Gly Thr Arg Val Ser Ile Val Ser Cys Asp Val Thr Asp Arg
2210 2215 2220

Glu Ala Leu Ala Glu Val Leu Lys Ala Leu Pro Ala Glu Asn Pro Leu
2225 2230 2235 2240

Thr Ala Val Val His Ala Ala Gly Val Ile Glu Thr Gly Asp Ala Ala
2245 2250 2255

Ala Met Ser Leu Ala Asp Phe Asp His Val Leu Ser Ala Lys Val Ala
2260 2265 2270

Gly Ala Ala Asn Leu Asp Ala Leu Leu Ala Asp Val Glu Leu Asp Ala
2275 2280 2285

Phe Val Leu Phe Ser Ser Val Ser Gly Val Trp Gly Ala Gly Gly His
2290 2295 2300

Gly Ala Tyr Ala Ala Ala Asn Ala Tyr Leu Asp Ala Leu Ala Glu Gln
305 2310 2315 2320

Arg Arg Ser Arg Gly Leu Val Ala Thr Ala Val Ala Trp Gly Pro Trp
2325 2330 2335

Ala Gly Glu Gly Met Ala Ser Gly Glu Thr Gly Asp Gln Leu Arg Arg
2340 2345 2350

Tyr Gly Leu Ser Pro Met Ala Pro Gln His Ala Ile Ala Gly Ile Arg
2355 2360 2365

Gln Ala Val Glu Gln Asp Glu Ile Ser Leu Val Val Ala Asp Val Asp
2370 2375 2380

Trp Ala Arg Phe Ser Ala Gly Leu Leu Ala Ala Arg Pro Arg Pro Leu
385 2390 2395 2400

Leu Asn Glu Leu Ala Glu Val Lys Glu Leu Leu Val Asp Ala Gln Pro
2405 2410 2415

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Glu Ala Gly Val Leu Ala Asp Ala Ser Leu Glu Trp Arg Gln Arg Leu
2420 2425 2430
Ser Ala Ala Pro Arg Pro Thr Gln Glu Gln Leu Ile Leu Glu Leu Val
2435 2440 2445
Arg Gly Glu Thr Ala Leu Val Leu Gly His Pro Gly Ala Ala Ala Val
2450 2455 2460
Ala Ser Glu Arg Ala Phe Lys Asp Ser Gly Phe Asp Ser Gln Ala Ala
465 2470 2475 2480
Val Glu Leu Arg Val Arg Leu Asn Arg Ala Thr Gly Leu Gln Leu Pro
2485 2490 2495
Ser Thr Ile Ile Phe Ser His Pro Thr Pro Ala Glu Leu Ala Ala Glu
2500 2505 2510
Leu Arg Ala Arg Leu Leu Pro Glu Ser Ala Gly Ala Gly Ile Pro Glu
2515 2520 2525
Glu Asp Glu Ala Arg Ile Arg Ala Ala Leu Thr Ser Ile Pro Phe Pro
2530 2535 2540
Ala Leu Arg Glu Ala Gly Leu Val Ser Pro Leu Leu Ala Leu Ala Gly
545 2550 2555 2560
His Pro Val Asp Ser Gly Ile Ser Ser Asp Asp Ala Ala Ala Thr Ser
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Ile Asp Ala Met Asp Val Ala Gly Leu Val Glu Ala Ala Leu Gly Glu
2580 2585 2590
Arg Glu Ser
2595

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Met Thr Val Thr Thr Ser Tyr Glu Glu Val Val Glu Ala Leu Arg Ala
1 5 10 15
tcg ctc aag gag aac gaa cgc ctc cgg cgc ggc agg gat cgg ttc tcc 96
Ser Leu Lys Glu Asn Glu Arg Leu Arg Gly Arg Asp Arg Phe Ser
20 25 30
gcg gag aag gac gat ccc atc gcg atc gtg gcg atg agt tgt cgt tat 144
Ala Glu Lys Asp Asp Pro Ile Ala Ile Val Ala Met Ser Cys Arg Tyr
35 40 45
ccc ggt cag gtc tcc tcg ccg gag gac ctg tgg caa ctg gct gcc ggc 192
Pro Gly Gln Val Ser Ser Pro Glu Asp Leu Trp Gln Leu Ala Ala Gly

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|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-----|
| 50 | | | | 55 | | | | 60 | | | | | | | | |
| ggt Gly 65 | gtg Val | gac Asp | gcg Ala | atc Ile | tcc Ser 70 | gaa Glu | gtt Val | ccg Pro | ggg Gly | gat Asp 75 | cgc Arg | gga Gly | tgg Trp | gac Asp | ctg Leu 80 | 240 |
| gat Asp | ggc Gly | gtg Val | ttc Phe | gtt Val 85 | ccg Pro | gac Asp | tcc Ser | gat Asp | cgt Arg 90 | cct Pro | ggc Gly | acg Thr | tcg Ser | tat Tyr 95 | gcc Ala | 288 |
| tgc Cys | gcg Ala | ggc Gly | ggt Gly 100 | ttt Phe | ctt Leu | cag Gln | ggc Gly | gtg Val 105 | tcg Ser | gag Glu | ttc Phe | gac Asp | gcg Ala 110 | ggt Gly | ttc Phe | 336 |
| ttc Phe | ggg Gly | att Ile 115 | tcg Ser | ccg Pro | cgt Arg | gag Glu | gcg Ala 120 | ctg Leu | gcg Ala | atg Met | gat Asp | ccg Pro 125 | cag Gln | cag Gln | cgg Arg | 384 |
| ttg Leu 130 | ctg Leu | ctg Leu | gaa Glu | gtc Val | gcg Ala | tgg Trp 135 | gag Glu | gtc Val | ttc Phe | gag Glu | cgg Arg 140 | gct Ala | ggg Gly | ctg Leu | gag Glu | 432 |
| cag Gln 145 | cgg Arg | tcg Ser | aca Thr | cgc Arg | ggt Gly 150 | tcc Ser | cgc Arg | gtt Val | ggc Gly | gtg Val 155 | ttc Phe | gtc Val | ggc Gly | acc Thr | aat Asn 160 | 480 |
| ggc Gly | cag Gln | gac Asp | tac Tyr | gcg Ala 165 | tcg Ser | tgg Trp | ttg Leu | cgg Arg | acg Thr 170 | ccg Pro | ccg Pro | cct Pro | gcg Ala | gtg Val 175 | gca Ala | 528 |
| ggt Gly | cat His | gtg Val 180 | ctg Leu | acg Thr | ggc Gly | ggt Gly | gcg Ala | gca Ala 185 | gcg Ala | gtt Val | ctt Leu | tcg Ser | ggc Gly 190 | cgg Arg | gtt Val | 576 |
| gcg Ala | tat Tyr | tcg Ser 195 | ttc Phe | ggg Gly | ttc Phe | gag Glu | ggt Gly 200 | cct Pro | gcg Ala | gtg Val | acg Thr | gtg Val 205 | gat Asp | acg Thr | gcg Ala | 624 |
| tgt Cys | tcg Ser 210 | tcg Ser | tcg Ser | ttg Leu | gtg Val | gcg Ala 215 | ttg Leu | cac His | ctg Leu | gcg Ala | ggg Gly 220 | caa Gln | gca Ala | ctg Leu | cgg Arg | 672 |
| gcc Ala 225 | ggt Gly | gag Glu | tgc Cys | gac Asp | ctt Leu 230 | gcc Ala | ctt Leu | gcc Ala | ggt Gly | ggc Gly 235 | gtc Val | acg Thr | gtg Val | atg Met | tcg Ser 240 | 720 |
| acg Thr | ccg Pro | aag Lys | gtg Val | ttc Phe 245 | ctg Leu | gag Glu | ttc Phe | tcc Ser | cgc Arg 250 | caa Gln | cgg Arg | ggt Gly | ctc Leu | gcg Ala 255 | ccg Pro | 768 |
| gat Asp | ggg Gly | cgg Arg | tgc Cys 260 | aag Lys | tcg Ser | ttc Phe | gcg Ala | gcg Ala 265 | ggt Gly | gcg Ala | gat Asp | ggc Gly | act Thr 270 | gga Gly | tgg Trp | 816 |
| ggt Gly | gag Glu | ggt Gly 275 | gcc Ala | gga Gly | ctg Leu | ttg Leu | ttg Leu 280 | ctg Leu | gag Glu | cgg Arg | ttg Leu | tcg Ser 285 | gat Asp | gcc Ala | cgg Arg | 864 |
| cgg Arg 290 | aat Asn | ggg Gly | cat His | gag Glu | gtg Val 295 | ctg Leu | gcg Ala | gtt Val | gtt Val | cgt Arg | ggt Gly 300 | agt Ser | gcg Ala | gtg Val | aat Asn | 912 |
| cag | gac | ggt | gcg | tcg | aat | ggt | ttg | acc | gcg | ccg | aat | ggt | tcg | tcg | cag | 960 |

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| | | | | | | | | | | | | | | | | |
|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|------|
| Gln 305 | Asp | Gly | Ala | Ser | Asn 310 | Gly | Leu | Thr | Ala | Pro 315 | Asn | Gly | Ser | Ser | Gln 320 | |
| cag Gln | cgg Arg | gtg Val | att Ile | acc Thr 325 | cag Gln | gcg Ala | ttg Leu | gcg Ala | agt Ser 330 | gcg Ala | ggg Gly | ttg Leu | tcg Ser | gtg Val 335 | tcc Ser | 1008 |
| gat Asp | gtg Val | gat Asp | gct Ala 340 | gtg Val | gag Glu | gcg Ala | cat His | ggg Gly 345 | acg Thr | ggc Gly | acg Thr | cgg Arg | ctt Leu 350 | ggt Gly | gat Asp | 1056 |
| ccg Pro | atc Ile | gag Glu 355 | gcg Ala | cag Gln | gcg Ala | ctg Leu | atc Ile 360 | gcc Ala | acc Thr | tac Tyr | ggc Gly 365 | cgt Arg 365 | gat Asp | cgt Arg | gat Asp | 1104 |
| cct Pro | ggc Gly 370 | cgg Arg | ccg Pro | ttg Leu | tgg Trp | ttg Leu 375 | ggg Gly | tcg Ser | gtc Val | aag Lys | tcg Ser 380 | aac Asn | atc Ile | ggt Gly | cat His | 1152 |
| acg Thr 385 | caa Gln | gcg Ala | gcg Ala | gcg Ala | ggt Gly 390 | gtg Val | gct Ala | ggt Gly | gtg Val | atc Ile 395 | aag Lys | atg Met | gtg Val | atg Met | gcg Ala 400 | 1200 |
| atg Met | cgg Arg | cac His | ggg Gly 405 | cag Gln | ctg Leu | cca Pro | cgc Arg | acg Thr 410 | ttg Leu | cac His | gtg Val | gaa Glu | tcg Ser | ccg Pro 415 | tcg Ser | 1248 |
| ccg Pro | gag Glu | gtg Val | gat Asp 420 | tgg Trp | tcg Ser | gcg Ala | ggg Gly | acg Thr 425 | gtt Val | caa Gln | ctc Leu | ctt Leu 430 | acg Thr | gag Glu | aac Asn | 1296 |
| acg Thr | ccc Pro | tgg Trp 435 | ccc Pro | agg Arg | agt Ser | ggt Gly | cgt Arg 440 | gtt Val | cgt Arg | cgg Arg | gtg Val | ggg Gly 445 | gtg Val | tcg Ser | tcg Ser | 1344 |
| ttc Phe | ggg Gly 450 | atc Ile | agt Ser | ggt Gly | act Thr | aac Asn 455 | gcg Ala | cac His | gtc Val | atc Ile 460 | ctc Leu 460 | gaa Glu | cag Gln | ccc Pro | ccg Pro | 1392 |
| gga Gly 465 | gtg Val | ccg Pro | agt Ser | cag Gln | tct Ser 470 | gcg Ala | ggg Gly | ccg Pro | ggt Gly | tcg Ser 475 | ggt Gly | tct Ser | gtc Val | gtg Val | gat Asp 480 | 1440 |
| gtt Val | ccg Pro | gtg Val | gtg Val | ccg Pro 485 | tgg Trp | atg Met | gtg Val | tcg Ser | ggc Gly 490 | aaa Lys | aca Thr | ccc Pro | gaa Glu | gcg Ala 495 | cta Leu | 1488 |
| tcc Ser | gcg Ala | cag Gln | gca Ala 500 | acg Thr | gcg Ala | ttg Leu | atg Met | acc Thr 505 | tat Tyr | ctg Leu | gac Asp | gag Glu 510 | cga Arg | cct Pro | gat Asp | 1536 |
| gtc Val | tcc Ser | tcg Ser 515 | ctg Leu | gat Asp | gtt Val | ggg Gly | tac Tyr 520 | tcg Ser | ctg Leu | gcg Ala | ttg Leu | aca Thr 525 | cgg Arg | tcg Ser | gcg Ala | 1584 |
| ctg Leu | gat Asp 530 | gag Glu | cga Arg | gcg Ala | gtg Val | gtg Val 535 | ctg Leu | ggg Gly | tcg Ser | gac Asp | cgt Arg 540 | gaa Glu | acg Thr | ttg Leu | ttg Leu | 1632 |
| tgc Cys 545 | ggt Gly | gtg Val | aaa Lys | gcg Ala | ctg Leu 550 | tct Ser | gcc Ala | ggt Gly | cat His | gag Glu 555 | gct Ala | tct Ser | ggg Gly | ttg Leu | gtg Val 560 | 1680 |

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|-------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|
| acc | gga | tct | gtg | ggg | gct | ggg | ggc | cgc | atc | ggg | ttt | gtg | ttt | tcc | ggt | |
| Thr | Gly | Ser | Val | Gly | Ala | Gly | Gly | Arg | Ile | Gly | Phe | Val | Phe | Ser | Gly | 1728 |
| | | | | 565 | | | | | 570 | | | | | 575 | | |
| cag | ggt | ggt | cag | tgg | ctg | ggg | atg | ggc | cgg | ggg | ctt | tac | cgg | gct | ttt | 1776 |
| Gln | Gly | Gly | Gln | Trp | Leu | Gly | Met | Gly | Arg | Gly | Leu | Tyr | Arg | Ala | Phe | |
| | | | 580 | | | | | 585 | | | | | 590 | | | |
| ccg | gtg | ttc | gct | gct | gcc | ttt | gac | gaa | gct | tgt | gcc | gag | ctg | gat | gca | 1824 |
| Pro | Val | Phe | Ala | Ala | Ala | Phe | Asp | Glu | Ala | Cys | Ala | Glu | Leu | Asp | Ala | |
| | | 595 | | | | | 600 | | | | | 605 | | | | |
| cat | ctg | ggc | cag | gaa | atc | ggg | gtt | cgg | gag | gtg | gtg | tcc | ggt | tcg | gat | 1872 |
| His | Leu | Gly | Gln | Glu | Ile | Gly | Val | Arg | Glu | Val | Val | Ser | Gly | Ser | Asp | |
| | 610 | | | | | 615 | | | | | 620 | | | | | |
| gcg | cag | ttg | ctg | gat | cgg | acg | ttg | tgg | gcg | cag | tcg | ggt | ttg | ttc | gcg | 1920 |
| Ala | Gln | Leu | Leu | Asp | Arg | Thr | Leu | Trp | Ala | Gln | Ser | Gly | Leu | Phe | Ala | |
| 625 | | | | | 630 | | | | | 635 | | | | | 640 | |
| ttg | cag | gtg | ggc | ttg | ctg | aag | ttg | ctg | gat | tcg | tgg | ggg | gtt | cgg | ccg | 1968 |
| Leu | Gln | Val | Gly | Leu | Leu | Lys | Leu | Leu | Asp | Ser | Trp | Gly | Val | Arg | Pro | |
| | | | 645 | | | | | | 650 | | | | | 655 | | |
| agt | gtg | gtg | ttg | ggg | cat | tcg | gtg | ggc | gag | ttg | gcg | gcg | gcg | ttc | gcg | 2016 |
| Ser | Val | Val | Leu | Gly | His | Ser | Val | Gly | Glu | Leu | Ala | Ala | Ala | Phe | Ala | |
| | | | 660 | | | | | 665 | | | | | 670 | | | |
| gcg | ggt | gtg | gtg | tcg | ttg | tcg | ggt | gcg | gct | cgg | ttg | gtg | gcg | ggt | cgt | 2064 |
| Ala | Gly | Val | Val | Ser | Leu | Ser | Gly | Ala | Ala | Arg | Leu | Val | Ala | Gly | Arg | |
| | | 675 | | | | | 680 | | | | | 685 | | | | |
| gcc | cgg | ttg | atg | cag | gcg | ttg | ccg | tct | ggc | ggt | ggg | atg | ctg | gcg | gtg | 2112 |
| Ala | Arg | Leu | Met | Gln | Ala | Leu | Pro | Ser | Gly | Gly | Gly | Met | Leu | Ala | Val | |
| | 690 | | | | | 695 | | | | | 700 | | | | | |
| cct | gct | ggt | gag | gag | ctg | ttg | tgg | tcg | ttg | ttg | gcc | gat | cag | ggt | gat | 2160 |
| Pro | Ala | Gly | Glu | Glu | Leu | Leu | Trp | Ser | Leu | Leu | Ala | Asp | Gln | Gly | Asp | |
| 705 | | | | | 710 | | | | | 715 | | | | | 720 | |
| cgt | gtg | ggg | atc | gcc | gcg | gtc | aac | gct | gcg | ggg | tcg | gtg | gtg | ctc | tct | 2208 |
| Arg | Val | Gly | Ile | Ala | Ala | Val | Asn | Ala | Ala | Gly | Ser | Val | Val | Leu | Ser | |
| | | | | 725 | | | | | 730 | | | | | 735 | | |
| ggt | gat | cgg | gat | gtg | ctc | gat | gac | ctt | gcc | ggt | cgg | ctg | gac | ggg | caa | 2256 |
| Gly | Asp | Arg | Asp | Val | Leu | Asp | Asp | Leu | Ala | Gly | Arg | Leu | Asp | Gly | Gln | |
| | | | 740 | | | | | 745 | | | | | 750 | | | |
| ggg | atc | cgg | tcg | agg | tgg | ttg | cgg | gtg | tcg | cat | gcg | ttt | cat | tcg | tat | 2304 |
| Gly | Ile | Arg | Ser | Arg | Trp | Leu | Arg | Val | Ser | His | Ala | Phe | His | Ser | Tyr | |
| | | 755 | | | | | 760 | | | | | 765 | | | | |
| cgg | atg | gat | ccg | atg | ctg | gcg | gag | ttc | gcc | gaa | ttg | gca | cga | acc | gtg | 2352 |
| Arg | Met | Asp | Pro | Met | Leu | Ala | Glu | Phe | Ala | Glu | Leu | Ala | Arg | Thr | Val | |
| | 770 | | | | | 775 | | | | | 780 | | | | | |
| gat | tac | cgg | cgt | tgt | gaa | gtg | ccg | atc | gtg | tcg | acc | ttg | acc | gga | gac | 2400 |
| Asp | Tyr | Arg | Arg | Cys | Glu | Val | Pro | Ile | Val | Ser | Thr | Leu | Thr | Gly | Asp | |
| 785 | | | | | 790 | | | | | 795 | | | | | 800 | |
| ctc | gat | gac | gct | ggc | agg | atg | agc | ggg | ccc | gac | tac | tgg | gtg | cgt | cag | 2448 |
| Leu | Asp | Asp | Ala | Gly | Arg | Met | Ser | Gly | Pro | Asp | Tyr | Trp | Val | Arg | Gln | |
| | | | | 805 | | | | | 810 | | | | | 815 | | |

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|-----|------|-----|------|-----|------|------|-----|------|------|-----|------|------|------|-----|------|------|
| gtg | cga | gag | ccg | gtc | cgc | ttc | gcc | gac | ggg | gtc | cag | gcg | ctg | gtc | gag | 2496 |
| Val | Arg | Glu | Pro | Val | Arg | Phe | Ala | Asp | Gly | Val | Gln | Ala | Leu | Val | Glu | |
| | | | 820 | | | | | 825 | | | | | 830 | | | |
| cac | gat | gtg | gcc | act | gtt | gtc | gag | ctc | ggg | ccg | gac | ggg | gcg | ttg | tcg | 2544 |
| His | Asp | Val | Ala | Thr | Val | Val | Glu | Leu | Gly | Pro | Asp | Gly | Ala | Leu | Ser | |
| | | 835 | | | | | 840 | | | | | 845 | | | | |
| gcg | ctg | atc | cag | gaa | tgt | gtc | gcc | gca | tcc | gat | cac | gcc | ggg | cgg | ctg | 2592 |
| Ala | Leu | Ile | Gln | Glu | Cys | Val | Ala | Ala | Ser | Asp | His | Ala | Gly | Arg | Leu | |
| | 850 | | | | | 855 | | | | | 860 | | | | | |
| agc | gcg | gtc | ccg | gcg | atg | cgc | agg | aac | cag | gac | gag | gcg | cag | aag | gtg | 2640 |
| Ser | Ala | Val | Pro | Ala | Met | Arg | Arg | Asn | Gln | Asp | Glu | Ala | Gln | Lys | Val | |
| | 865 | | | | 870 | | | | | 875 | | | | | 880 | |
| atg | acg | gcc | ctg | gca | cac | gtc | cac | gta | cgt | ggg | ggg | gcg | gtg | gac | tgg | 2688 |
| Met | Thr | Ala | Leu | Ala | His | Val | His | Val | Arg | Gly | Gly | Ala | Val | Asp | Trp | |
| | | | | 885 | | | | | 890 | | | | | 895 | | |
| cgg | tcg | ttc | ttc | gcc | ggg | acg | gga | gcg | aaa | caa | atc | gag | ctg | ccc | acc | 2736 |
| Arg | Ser | Phe | Phe | Ala | Gly | Thr | Gly | Ala | Lys | Gln | Ile | Glu | Leu | Pro | Thr | |
| | | | 900 | | | | 905 | | | | | | 910 | | | |
| tac | gcc | ttc | caa | cga | cag | cgg | tac | tgg | ctg | gtg | cca | tcg | gat | tcc | ggg | 2784 |
| Tyr | Ala | Phe | Gln | Arg | Gln | Arg | Tyr | Trp | Leu | Val | Pro | Ser | Asp | Ser | Gly | |
| | | 915 | | | | | 920 | | | | | 925 | | | | |
| gat | gtg | aca | ggg | gcc | ggg | ctg | gcc | ggg | gcg | gag | cat | ccg | ctg | ttg | ggg | 2832 |
| Asp | Val | Thr | Gly | Ala | Gly | Leu | Ala | Gly | Ala | Glu | His | Pro | Leu | Leu | Gly | |
| | 930 | | | | | 935 | | | | | 940 | | | | | |
| gct | gtg | gtg | ccg | gtc | gcg | ggg | ggg | gac | gag | gtg | ttg | ctg | acc | ggc | agg | 2880 |
| Ala | Val | Val | Pro | Val | Ala | Gly | Gly | Asp | Glu | Val | Leu | Leu | Thr | Gly | Arg | |
| | 945 | | | | 950 | | | | | 955 | | | | | 960 | |
| att | tcg | gtg | cgg | acg | cat | ccg | tgg | ctg | gcc | gaa | cac | cgg | gtg | ctg | ggg | 2928 |
| Ile | Ser | Val | Arg | Thr | His | Pro | Trp | Leu | Ala | Glu | His | Arg | Val | Leu | Gly | |
| | | | | 965 | | | | | 970 | | | | | 975 | | |
| gaa | gtg | atc | gtt | gcg | ggc | acc | gcg | ttg | ctg | gag | atc | gcc | ttg | cac | gcg | 2976 |
| Glu | Val | Ile | Val | Ala | Gly | Thr | Ala | Leu | Leu | Glu | Ile | Ala | Leu | His | Ala | |
| | | | 980 | | | | 985 | | | | | | 990 | | | |
| ggg | gaa | cgt | ctt | ggg | tgt | gaa | cgg | gtg | gaa | gag | ctc | acc | ctg | gaa | gca | 3024 |
| Gly | Glu | Arg | Leu | Gly | Cys | Glu | Arg | Val | Glu | Glu | Leu | Thr | Leu | Glu | Ala | |
| | | 995 | | | | 1000 | | | | | | 1005 | | | | |
| ccg | ctg | gtc | ctg | ccg | gag | cgc | ggg | gcg | atc | cag | gtt | cag | ctg | cga | gtg | 3072 |
| Pro | Leu | Val | Leu | Pro | Glu | Arg | Gly | Ala | Ile | Gln | Val | Gln | Leu | Arg | Val | |
| | 1010 | | | | | 1015 | | | | | 1020 | | | | | |
| ggc | gcg | ccc | gag | aat | tcc | gga | cgc | agg | ccg | atg | gcg | ctg | tat | tca | cgc | 3120 |
| Gly | Ala | Pro | Glu | Asn | Ser | Gly | Arg | Arg | Pro | Met | Ala | Leu | Tyr | Ser | Arg | |
| | 1025 | | | | 1030 | | | | 1035 | | | | | | 1040 | |
| ccc | gaa | ggg | gcg | gcg | gag | cat | gac | tgg | acg | cgg | cac | gcc | acg | ggc | cgg | 3168 |
| Pro | Glu | Gly | Ala | Ala | Glu | His | Asp | Trp | Thr | Arg | His | Ala | Thr | Gly | Arg | |
| | | | 1045 | | | | | 1050 | | | | | 1055 | | | |
| ttg | gcg | cca | ggc | cgc | ggc | gag | gcg | gct | gga | gac | ctg | gcc | gac | tgg | ccg | 3216 |
| Leu | Ala | Pro | Gly | Arg | Gly | Glu | Ala | Ala | Gly | Asp | Leu | Ala | Asp | Trp | Pro | |

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| 1060 | 1065 | 1070 | |
|---|------|------|------|
| gct cct ggc gcg ctg ccg gtc gac ctc gac gaa ttc tat cgg gac ctc Ala Pro Gly Ala Leu Pro Val Asp Leu Asp Glu Phe Tyr Arg Asp Leu 1075 1080 1085 | | | 3264 |
| gca gag ctt ggg ctg gag tac ggc ccg atc ttc caa ggg ctc aag gcg Ala Glu Leu Gly Leu Glu Tyr Gly Pro Ile Phe Gln Gly Leu Lys Ala 1090 1095 1100 | | | 3312 |
| gcc tgg cgg caa ggg gac gag gtg tac gcc gaa gcc gcg ctg ccg gga Ala Trp Arg Gln Gly Asp Glu Val Tyr Ala Glu Ala Ala Leu Pro Gly 1105 1110 1115 1120 | | | 3360 |
| acg gaa gat tct ggt ttc ggg gtg cat ccg gca ctg ctg gac gcg gct Thr Glu Asp Ser Gly Phe Gly Val His Pro Ala Leu Leu Asp Ala Ala 1125 1130 1135 | | | 3408 |
| ctg cac gca acg gct gtc cga gac atg gat gac gca cgc ttg ccg ttc Leu His Ala Thr Ala Val Arg Asp Met Asp Asp Ala Arg Leu Pro Phe 1140 1145 1150 | | | 3456 |
| cag tgg gaa ggt gtg tcc ctg cac gcc aag gcc gcg ccg gct ttg cgg Gln Trp Glu Gly Val Ser Leu His Ala Lys Ala Ala Pro Ala Leu Arg 1155 1160 1165 | | | 3504 |
| gtc cgc gtg gtc ccg gct ggt gac gat gcc aag tcc ctg ctg gtt tgt Val Arg Val Val Pro Ala Gly Asp Asp Ala Lys Ser Leu Leu Val Cys 1170 1175 1180 | | | 3552 |
| gat ggc acc ggt cga ccg gtg atc tcg gtg gac cga ctc gta ttg cgg Asp Gly Thr Gly Arg Pro Val Ile Ser Val Asp Arg Leu Val Leu Arg 1185 1190 1195 1200 | | | 3600 |
| tcg gct gcg gcc cgg cgg acc ggt gcg cgc cga cag gcc cat caa gct Ser Ala Ala Ala Arg Arg Thr Gly Ala Arg Arg Gln Ala His Gln Ala 1205 1210 1215 | | | 3648 |
| cgg ttg tac cgg ttg agc tgg cca acg gtt caa ctg ccg aca tcc gct Arg Leu Tyr Arg Leu Ser Trp Pro Thr Val Gln Leu Pro Thr Ser Ala 1220 1225 1230 | | | 3696 |
| cag cca ccg tcc tgc gtg ctt ctc ggc acc tca gaa gtg tcc gct gac Gln Pro Pro Ser Cys Val Leu Leu Gly Thr Ser Glu Val Ser Ala Asp 1235 1240 1245 | | | 3744 |
| ata cag gtg tat ccg gac ctc cgg tcg ttg acg gct gcg ttg gat gcc Ile Gln Val Tyr Pro Asp Leu Arg Ser Leu Thr Ala Ala Leu Asp Ala 1250 1255 1260 | | | 3792 |
| ggt gcc gaa cca ccc ggc gtc gtc atc gca ccc acg ccc ccc ggc ggt Gly Ala Glu Pro Pro Gly Val Val Ile Ala Pro Thr Pro Pro Gly Gly 1265 1270 1275 1280 | | | 3840 |
| gga cga aca gcg gat gtc cgg gag acg act cgg cat gca ctc gac ctg Gly Arg Thr Ala Asp Val Arg Glu Thr Thr Arg His Ala Leu Asp Leu 1285 1290 1295 | | | 3888 |
| gta caa ggc tgg ctt tcc gat cag cga ctc aac gaa tcc cga ttg ctc Val Gln Gly Trp Leu Ser Asp Gln Arg Leu Asn Glu Ser Arg Leu Leu 1300 1305 1310 | | | 3936 |
| ctg gtg aca cag gga gca gtg gcc gtg gag ccg ggc gaa ccc gtg acc | | | 3984 |

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| | |
|---|------|
| Leu Val Thr Gln Gly Ala Val Ala Val Glu Pro Gly Glu Pro Val Thr | |
| 1315 1320 1325 | |
| gat ctg gcg cag gcc gcg ctc tgg gga ctg ctg cgg tcg acg cag acc | 4032 |
| Asp Leu Ala Gln Ala Ala Leu Trp Gly Leu Leu Arg Ser Thr Gln Thr | |
| 1330 1335 1340 | |
| gaa cac cct gat cgc ttc gtc ctc gtc gat gtg cct gag ccc gcg caa | 4080 |
| Glu His Pro Asp Arg Phe Val Leu Val Asp Val Pro Glu Pro Ala Gln | |
| 1345 1350 1355 1360 | |
| ctc ctc ccc gcg ctg ccg ggg gtg ctg gcc tgc ggc gaa cct cag ctc | 4128 |
| Leu Leu Pro Ala Leu Pro Gly Val Leu Ala Cys Gly Glu Pro Gln Leu | |
| 1365 1370 1375 | |
| gcg ttg cga cgt ggc ggc gct cat gcg ccc aga ctg gct gga ctg ggc | 4176 |
| Ala Leu Arg Arg Gly Gly Ala His Ala Pro Arg Leu Ala Gly Leu Gly | |
| 1380 1385 1390 | |
| agc gat gac gtc ctg ccc gtg ccg gac ggc acc ggg tgg cga ttg gag | 4224 |
| Ser Asp Asp Val Leu Pro Val Pro Asp Gly Thr Gly Trp Arg Leu Glu | |
| 1395 1400 1405 | |
| gcc acg cgc ccg gga agc ctg gat ggg ttg gca ttg gtg gac gaa ccg | 4272 |
| Ala Thr Arg Pro Gly Ser Leu Asp Gly Leu Ala Leu Val Asp Glu Pro | |
| 1410 1415 1420 | |
| acg gcc acg gca ccg ctg ggt gac ggt gag gtc agg att gcg atg cgc | 4320 |
| Thr Ala Thr Ala Pro Leu Gly Asp Gly Glu Val Arg Ile Ala Met Arg | |
| 1425 1430 1435 1440 | |
| gcg gcc ggg gtg aac ttc cgg gat gcg ctc atc gcg ctc ggt atg tat | 4368 |
| Ala Ala Gly Val Asn Phe Arg Asp Ala Leu Ile Ala Leu Gly Met Tyr | |
| 1445 1450 1455 | |
| ccc ggt gtg gca tcg ctg ggc agt gag ggc gcc ggg gtc gtg gtg gag | 4416 |
| Pro Gly Val Ala Ser Leu Gly Ser Glu Gly Ala Gly Val Val Val Glu | |
| 1460 1465 1470 | |
| acc ggc ccc ggc gtc acc ggc ctg gca ccc ggc gac cgc gtg atg gga | 4464 |
| Thr Gly Pro Gly Val Thr Gly Leu Ala Pro Gly Asp Arg Val Met Gly | |
| 1475 1480 1485 | |
| atg atc ccg aag gcg ttc ggg ccg ctc gcg gtc gcc gac cat cgc atg | 4512 |
| Met Ile Pro Lys Ala Phe Gly Pro Leu Ala Val Ala Asp His Arg Met | |
| 1490 1495 1500 | |
| gtg acg agg att ccc gct ggt tgg agc ttc gcg cgg gcc gca tcg gtg | 4560 |
| Val Thr Arg Ile Pro Ala Gly Trp Ser Phe Ala Arg Ala Ala Ser Val | |
| 1505 1510 1515 1520 | |
| ccg atc gtc ttt ctc acc gcc tac tac gcg ctg gtt gat ctc gcc ggg | 4608 |
| Pro Ile Val Phe Leu Thr Ala Tyr Tyr Ala Leu Val Asp Leu Ala Gly | |
| 1525 1530 1535 | |
| ttg aga cca ggg gag tcg ttg ctg gtt cat tcg gcc gcc ggt ggg gtg | 4656 |
| Leu Arg Pro Gly Glu Ser Leu Leu Val His Ser Ala Ala Gly Gly Val | |
| 1540 1545 1550 | |
| ggg atg gcc gcg atc caa ctc gcc agg cac ctc ggt gca gag gtg tac | 4704 |
| Gly Met Ala Ala Ile Gln Leu Ala Arg His Leu Gly Ala Glu Val Tyr | |
| 1555 1560 1565 | |

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| | |
|---|------|
| gcc acc gct agc gag gac aag tgg caa gcc gtg gag ctg agc cga gaa | 4752 |
| Ala Thr Ala Ser Glu Asp Lys Trp Gln Ala Val Glu Leu Ser Arg Glu | |
| 1570 1575 1580 | |
| cac ctc gct tcg tcg cgg acg tgc gat ttc gag cag cag ttc ctc ggg | 4800 |
| His Leu Ala Ser Ser Arg Thr Cys Asp Phe Glu Gln Gln Phe Leu Gly | |
| 1585 1590 1595 1600 | |
| gca acc ggc gga cgc ggc gtc gac gtc gtg ctc aac tcc ctc gcc ggg | 4848 |
| Ala Thr Gly Gly Arg Gly Val Asp Val Val Leu Asn Ser Leu Ala Gly | |
| 1605 1610 1615 | |
| gag ttc gcc gat gcg tct ctg cga atg ctg ccg cgc ggt ggc cgt ttc | 4896 |
| Glu Phe Ala Asp Ala Ser Leu Arg Met Leu Pro Arg Gly Gly Arg Phe | |
| 1620 1625 1630 | |
| ctg gag ttg ggg aag acg gat gtt cgt gac ccc gtc gag gtc gcc gat | 4944 |
| Leu Glu Leu Gly Lys Thr Asp Val Arg Asp Pro Val Glu Val Ala Asp | |
| 1635 1640 1645 | |
| gcg cat ccg ggc gtg tct tac cag gct ttc gat acc gta gag gca ggc | 4992 |
| Ala His Pro Gly Val Ser Tyr Gln Ala Phe Asp Thr Val Glu Ala Gly | |
| 1650 1655 1660 | |
| ccg cag cga atc ggc gag atg ctt cac gag ctg gtg gag ttg ttc gag | 5040 |
| Pro Gln Arg Ile Gly Glu Met Leu His Glu Val Glu Leu Phe Glu | |
| 1665 1670 1675 1680 | |
| gga cgc gtg ctg gag ccc ctg cct gtc acg gct tgg gac gtt cgg cag | 5088 |
| Gly Arg Val Leu Glu Pro Leu Pro Val Thr Ala Trp Asp Val Arg Gln | |
| 1685 1690 1695 | |
| gcg ccc gag gcg cta cgg cac ctg agc caa gcg cgg cat gtg gga aag | 5136 |
| Ala Pro Glu Ala Leu Arg His Leu Ser Gln Ala Arg His Val Gly Lys | |
| 1700 1705 1710 | |
| ctg gtg ctc acc atg cct ccg gtg tgg gac gcc gca ggc acg gtt ctg | 5184 |
| Leu Val Leu Thr Met Pro Pro Val Trp Asp Ala Ala Gly Thr Val Leu | |
| 1715 1720 1725 | |
| gtt acc ggc gga acg gga gca ctt ggc gca gag gtc gcc cgg cac ctc | 5232 |
| Val Thr Gly Gly Thr Gly Ala Leu Gly Ala Glu Val Ala Arg His Leu | |
| 1730 1735 1740 | |
| gtg atc gag cgc ggg gtg cga aac ctg gtc ctc gtc agc agg cgc ggt | 5280 |
| Val Ile Glu Arg Gly Val Arg Asn Leu Val Leu Val Ser Arg Arg Gly | |
| 1745 1750 1755 1760 | |
| ccc gca gcc agt ggc gct gct gag ctc gtg gcg caa ctg acg gcc tac | 5328 |
| Pro Ala Ala Ser Gly Ala Ala Glu Leu Val Ala Gln Leu Thr Ala Tyr | |
| 1765 1770 1775 | |
| ggt gcc gag gtt tcc ttg cag gct tgc gat gtc gcc gat cgt gag acc | 5376 |
| Gly Ala Glu Val Ser Leu Gln Ala Cys Asp Val Ala Asp Arg Glu Thr | |
| 1780 1785 1790 | |
| ttg gcg aag gtg ctt gcc agc atc ccg gac gag cat ccg ttg acc gcc | 5424 |
| Leu Ala Lys Val Leu Ala Ser Ile Pro Asp Glu His Pro Leu Thr Ala | |
| 1795 1800 1805 | |
| gtg gtg cac gcg gct ggt gtt ctc gac gac gga gtg tcc gaa tcg ctc | 5472 |
| Val Val His Ala Ala Gly Val Leu Asp Asp Gly Val Ser Glu Ser Leu | |
| 1810 1815 1820 | |

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| | |
|---|------|
| acc gtg gag cgg ctg gac cag gtt ctg cgc ccg aag gtc gat ggc gcg Thr Val Glu Arg Leu Asp Gln Val Leu Arg Pro Lys Val Asp Gly Ala 1825 1830 1835 1840 | 5520 |
| cgg aat ctg ctc gag ctg atc gac ccg gac gtg gcc ctc gtg ttg ttc Arg Asn Leu Leu Glu Leu Ile Asp Pro Asp Val Ala Leu Val Leu Phe 1845 1850 1855 | 5568 |
| tcg tcg gtg tcg ggt gtg ctc ggc agc ggt ggg cag ggt aac tac gcg Ser Ser Val Ser Gly Val Leu Gly Ser Gly Gly Gln Gly Asn Tyr Ala 1860 1865 1870 | 5616 |
| gcg gcc aac tcc ttc ctc gac gca ttg gcg cag caa agg cag tcg cgc Ala Ala Asn Ser Phe Leu Asp Ala Leu Ala Gln Gln Arg Gln Ser Arg 1875 1880 1885 | 5664 |
| ggc cta ccg acg aga tca ttg gcc tgg ggg ccc tgg gcg gaa cat ggc Gly Leu Pro Thr Arg Ser Ala Trp Gly Pro Trp Ala Glu His Gly 1890 1895 1900 | 5712 |
| atg gcc agc acc ttg cgc gaa gcc gag cag gat cga ttg gcg cga tct Met Ala Ser Thr Leu Arg Glu Ala Glu Gln Asp Arg Leu Ala Arg Ser 1905 1910 1915 1920 | 5760 |
| ggg ttg ctg ccg atc tcg acc gag gag ggg ttg tcc cag ttc gac gcc Gly Leu Leu Pro Ile Ser Thr Glu Glu Gly Leu Ser Gln Phe Asp Ala 1925 1930 1935 | 5808 |
| gcg tgc ggc ggc gcg cat acc gtg gtg gcg ccg gtt cga ttc agc cgc Ala Cys Gly Gly Ala His Thr Val Val Ala Pro Val Arg Phe Ser Arg 1940 1945 1950 | 5856 |
| ttg tcc gac ggg aac gcg atc aag ttc tcc gtc ctg caa ggt ttg gtc Leu Ser Asp Gly Asn Ala Ile Lys Phe Ser Val Leu Gln Gly Leu Val 1955 1960 1965 | 5904 |
| ggg ccg cat cgc gtc aac aaa gcg gcg act gcg gat gat gcc gag agc Gly Pro His Arg Val Asn Lys Ala Ala Thr Ala Asp Asp Ala Glu Ser 1970 1975 1980 | 5952 |
| ctc cgg aaa cgg ttg gga cgc ttg ccg gat gca gaa caa cat cgg att Leu Arg Lys Arg Leu Gly Arg Leu Pro Asp Ala Glu Gln His Arg Ile 1985 1990 1995 2000 | 6000 |
| ctg ctg gac ctc gtc cgc atg cat gtg gcg gca gtg ctc gga ttc gcc Leu Leu Asp Leu Val Arg Met His Val Ala Ala Val Leu Gly Phe Ala 2005 2010 2015 | 6048 |
| ggt tct cag gag atc acc gcg gac ggc acg ttc aag gtg ctg ggc ttc Gly Ser Gln Glu Ile Thr Ala Asp Gly Thr Phe Lys Val Leu Gly Phe 2020 2025 2030 | 6096 |
| gac tcg ttg acc gtg gtc gag ttg cgc aac cgg atc aac ggg gcg acg Asp Ser Leu Thr Val Val Glu Leu Arg Asn Arg Ile Asn Gly Ala Thr 2035 2040 2045 | 6144 |
| ggg ctg cga ctg ccc gcc acc ctg gtg ttc aac tac ccg acg ccg gat Gly Leu Arg Leu Pro Ala Thr Leu Val Phe Asn Tyr Pro Thr Pro Asp 2050 2055 2060 | 6192 |
| gcg ctc gcc gcg cac ctc gtc acc gcg ctg tcc gca gac cgc ctg gcc Ala Leu Ala Ala His Leu Val Thr Ala Leu Ser Ala Asp Arg Leu Ala 2065 2070 2075 2080 | 6240 |

| 2065 | 2070 | LeA33955-US 2075 | 2080 | |
|---|------|---------------------|------|------|
| ggg aca ttc gag gaa ctc gac agg tgg gcg gcg aac ctg ccc acg ctg | | | | 6288 |
| Gly Thr Phe Glu Glu Leu Asp Arg Trp Ala Ala Asn Leu Pro Thr Leu | 2085 | 2090 | 2095 | |
| gcc agg gat gag gcc acg cgg gcg cag atc acc acc cgg cta cag gcg | | | | 6336 |
| Ala Arg Asp Glu Ala Thr Arg Ala Gln Ile Thr Thr Arg Leu Gln Ala | 2100 | 2105 | 2110 | |
| atc ttg cag agc ctg gcg gac gtg tcc ggc gga acc ggc ggc ggc tcc | | | | 6384 |
| Ile Leu Gln Ser Leu Ala Asp Val Ser Gly Gly Thr Gly Gly Gly Ser | 2115 | 2120 | 2125 | |
| gtg ccg gac cgg ctc aga tcg gcc acg gac gac gag ctt ttc caa ctc | | | | 6432 |
| Val Pro Asp Arg Leu Arg Ser Ala Thr Asp Asp Glu Leu Phe Gln Leu | 2130 | 2135 | 2140 | |
| ctc gac aac gat ctc gaa ctt ccc tga | | | | 6459 |
| Leu Asp Asn Asp Leu Glu Leu Pro | 2145 | 2150 | | |

<210> 44
 <211> 2152
 <212> PRT
 <213> Saccharopolyspora spinosa

<400> 44
 Met Thr Val Thr Thr Ser Tyr Glu Glu Val Val Glu Ala Leu Arg Ala
 1 5 10 15
 Ser Leu Lys Glu Asn Glu Arg Leu Arg Arg Gly Arg Asp Arg Phe Ser
 20 25 30
 Ala Glu Lys Asp Asp Pro Ile Ala Ile Val Ala Met Ser Cys Arg Tyr
 35 40 45
 Pro Gly Gln Val Ser Ser Pro Glu Asp Leu Trp Gln Leu Ala Ala Gly
 50 55 60
 Gly Val Asp Ala Ile Ser Glu Val Pro Gly Asp Arg Gly Trp Asp Leu
 65 70 75 80
 Asp Gly Val Phe Val Pro Asp Ser Asp Arg Pro Gly Thr Ser Tyr Ala
 85 90 95
 Cys Ala Gly Gly Phe Leu Gln Gly Val Ser Glu Phe Asp Ala Gly Phe
 100 105 110
 Phe Gly Ile Ser Pro Arg Glu Ala Leu Ala Met Asp Pro Gln Gln Arg
 115 120 125
 Leu Leu Leu Glu Val Ala Trp Glu Val Phe Glu Arg Ala Gly Leu Glu
 130 135 140
 Gln Arg Ser Thr Arg Gly Ser Arg Val Gly Val Phe Val Gly Thr Asn
 145 150 155 160
 Gly Gln Asp Tyr Ala Ser Trp Leu Arg Thr Pro Pro Pro Ala Val Ala
 165 170 175
 Gly His Val Leu Thr Gly Gly Ala Ala Ala Val Leu Ser Gly Arg Val

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| 180 | | | | | 185 | | | | | 190 | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Ala | Tyr | Ser | Phe | Gly | Phe | Glu | Gly | Pro | Ala | Val | Thr | Val | Asp | Thr | Ala |
| | | 195 | | | | | 200 | | | | | 205 | | | |
| Cys | Ser | Ser | Ser | Leu | Val | Ala | Leu | His | Leu | Ala | Gly | Gln | Ala | Leu | Arg |
| | 210 | | | | | 215 | | | | | 220 | | | | |
| Ala | Gly | Glu | Cys | Asp | Leu | Ala | Leu | Ala | Gly | Gly | Val | Thr | Val | Met | Ser |
| 225 | | | | | 230 | | | | | 235 | | | | | 240 |
| Thr | Pro | Lys | Val | Phe | Leu | Glu | Phe | Ser | Arg | Gln | Arg | Gly | Leu | Ala | Pro |
| | | | | 245 | | | | | 250 | | | | | 255 | |
| Asp | Gly | Arg | Cys | Lys | Ser | Phe | Ala | Ala | Gly | Ala | Asp | Gly | Thr | Gly | Trp |
| | | | 260 | | | | | 265 | | | | | 270 | | |
| Gly | Glu | Gly | Ala | Gly | Leu | Leu | Leu | Leu | Glu | Arg | Leu | Ser | Asp | Ala | Arg |
| | | 275 | | | | | 280 | | | | | 285 | | | |
| Arg | Asn | Gly | His | Glu | Val | Leu | Ala | Val | Val | Arg | Gly | Ser | Ala | Val | Asn |
| | 290 | | | | | 295 | | | | | 300 | | | | |
| Gln | Asp | Gly | Ala | Ser | Asn | Gly | Leu | Thr | Ala | Pro | Asn | Gly | Ser | Ser | Gln |
| 305 | | | | | 310 | | | | | 315 | | | | | 320 |
| Gln | Arg | Val | Ile | Thr | Gln | Ala | Leu | Ala | Ser | Ala | Gly | Leu | Ser | Val | Ser |
| | | | | 325 | | | | | 330 | | | | | 335 | |
| Asp | Val | Asp | Ala | Val | Glu | Ala | His | Gly | Thr | Gly | Thr | Arg | Leu | Gly | Asp |
| | | | 340 | | | | | 345 | | | | | 350 | | |
| Pro | Ile | Glu | Ala | Gln | Ala | Leu | Ile | Ala | Thr | Tyr | Gly | Arg | Asp | Arg | Asp |
| | | 355 | | | | | 360 | | | | | 365 | | | |
| Pro | Gly | Arg | Pro | Leu | Trp | Leu | Gly | Ser | Val | Lys | Ser | Asn | Ile | Gly | His |
| | 370 | | | | 375 | | | | | 380 | | | | | |
| Thr | Gln | Ala | Ala | Ala | Gly | Val | Ala | Gly | Val | Ile | Lys | Met | Val | Met | Ala |
| 385 | | | | | 390 | | | | | 395 | | | | | 400 |
| Met | Arg | His | Gly | Gln | Leu | Pro | Arg | Thr | Leu | His | Val | Glu | Ser | Pro | Ser |
| | | | | 405 | | | | | 410 | | | | | 415 | |
| Pro | Glu | Val | Asp | Trp | Ser | Ala | Gly | Thr | Val | Gln | Leu | Leu | Thr | Glu | Asn |
| | | | 420 | | | | | 425 | | | | | 430 | | |
| Thr | Pro | Trp | Pro | Arg | Ser | Gly | Arg | Val | Arg | Arg | Val | Gly | Val | Ser | Ser |
| | | 435 | | | | | 440 | | | | | 445 | | | |
| Phe | Gly | Ile | Ser | Gly | Thr | Asn | Ala | His | Val | Ile | Leu | Glu | Gln | Pro | Pro |
| | 450 | | | | | 455 | | | | | 460 | | | | |
| Gly | Val | Pro | Ser | Gln | Ser | Ala | Gly | Pro | Gly | Ser | Gly | Ser | Val | Val | Asp |
| 465 | | | | | 470 | | | | | 475 | | | | | 480 |
| Val | Pro | Val | Val | Pro | Trp | Met | Val | Ser | Gly | Lys | Thr | Pro | Glu | Ala | Leu |
| | | | | 485 | | | | | 490 | | | | | 495 | |
| Ser | Ala | Gln | Ala | Thr | Ala | Leu | Met | Thr | Tyr | Leu | Asp | Glu | Arg | Pro | Asp |
| | | | 500 | | | | | 505 | | | | | 510 | | |
| Val | Ser | Ser | Leu | Asp | Val | Gly | Tyr | Ser | Leu | Ala | Leu | Thr | Arg | Ser | Ala |

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515 520 525
 Leu Asp Glu Arg Ala Val Val Leu Gly Ser Asp Arg Glu Thr Leu Leu
 530 535 540
 Cys Gly Val Lys Ala Leu Ser Ala Gly His Glu Ala Ser Gly Leu Val
 545 550 555 560
 Thr Gly Ser Val Gly Ala Gly Gly Arg Ile Gly Phe Val Phe Ser Gly
 565 570 575
 Gln Gly Gly Gln Trp Leu Gly Met Gly Arg Gly Leu Tyr Arg Ala Phe
 580 585 590
 Pro Val Phe Ala Ala Ala Phe Asp Glu Ala Cys Ala Glu Leu Asp Ala
 595 600 605
 His Leu Gly Gln Glu Ile Gly Val Arg Glu Val Val Ser Gly Ser Asp
 610 615 620
 Ala Gln Leu Leu Asp Arg Thr Leu Trp Ala Gln Ser Gly Leu Phe Ala
 625 630 635 640
 Leu Gln Val Gly Leu Leu Lys Leu Leu Asp Ser Trp Gly Val Arg Pro
 645 650 655
 Ser Val Val Leu Gly His Ser Val Gly Glu Leu Ala Ala Ala Phe Ala
 660 665 670
 Ala Gly Val Val Ser Leu Ser Gly Ala Ala Arg Leu Val Ala Gly Arg
 675 680 685
 Ala Arg Leu Met Gln Ala Leu Pro Ser Gly Gly Gly Met Leu Ala Val
 690 695 700
 Pro Ala Gly Glu Glu Leu Leu Trp Ser Leu Leu Ala Asp Gln Gly Asp
 705 710 715 720
 Arg Val Gly Ile Ala Ala Val Asn Ala Ala Gly Ser Val Val Leu Ser
 725 730 735
 Gly Asp Arg Asp Val Leu Asp Asp Leu Ala Gly Arg Leu Asp Gly Gln
 740 745 750
 Gly Ile Arg Ser Arg Trp Leu Arg Val Ser His Ala Phe His Ser Tyr
 755 760 765
 Arg Met Asp Pro Met Leu Ala Glu Phe Ala Glu Leu Ala Arg Thr Val
 770 775 780
 Asp Tyr Arg Arg Cys Glu Val Pro Ile Val Ser Thr Leu Thr Gly Asp
 785 790 795 800
 Leu Asp Asp Ala Gly Arg Met Ser Gly Pro Asp Tyr Trp Val Arg Gln
 805 810 815
 Val Arg Glu Pro Val Arg Phe Ala Asp Gly Val Gln Ala Leu Val Glu
 820 825 830
 His Asp Val Ala Thr Val Val Glu Leu Gly Pro Asp Gly Ala Leu Ser
 835 840 845
 Ala Leu Ile Gln Glu Cys Val Ala Ala Ser Asp His Ala Gly Arg Leu

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860

| | | | | | | | | | | | | | | | |
|-----|------|------|------|-----|------|------|------|------|------|------|------|------|------|------|------|
| 850 | | 855 | | | | | | | | | | | | | |
| Ser | Ala | Val | Pro | Ala | Met | Arg | Arg | Asn | Gln | Asp | Glu | Ala | Gln | Lys | Val |
| 865 | | | | | 870 | | | | | 875 | | | | | 880 |
| Met | Thr | Ala | Leu | Ala | His | Val | His | Val | Arg | Gly | Gly | Ala | Val | Asp | Trp |
| | | | | 885 | | | | | 890 | | | | | 895 | |
| Arg | Ser | Phe | Phe | Ala | Gly | Thr | Gly | Ala | Lys | Gln | Ile | Glu | Leu | Pro | Thr |
| | | | 900 | | | | | 905 | | | | | 910 | | |
| Tyr | Ala | Phe | Gln | Arg | Gln | Arg | Tyr | Trp | Leu | Val | Pro | Ser | Asp | Ser | Gly |
| | | 915 | | | | | 920 | | | | | 925 | | | |
| Asp | Val | Thr | Gly | Ala | Gly | Leu | Ala | Gly | Ala | Glu | His | Pro | Leu | Leu | Gly |
| | 930 | | | | | 935 | | | | | 940 | | | | |
| Ala | Val | Val | Pro | Val | Ala | Gly | Gly | Asp | Glu | Val | Leu | Leu | Thr | Gly | Arg |
| 945 | | | | | 950 | | | | | 955 | | | | | 960 |
| Ile | Ser | Val | Arg | Thr | His | Pro | Trp | Leu | Ala | Glu | His | Arg | Val | Leu | Gly |
| | | | | 965 | | | | | 970 | | | | | | 975 |
| Glu | Val | Ile | Val | Ala | Gly | Thr | Ala | Leu | Glu | Ile | Ala | Leu | His | Ala | |
| | | | 980 | | | | | 985 | | | | | 990 | | |
| Gly | Glu | Arg | Leu | Gly | Cys | Glu | Arg | Val | Glu | Glu | Leu | Thr | Leu | Glu | Ala |
| | | 995 | | | | | 1000 | | | | | 1005 | | | |
| Pro | Leu | Val | Leu | Pro | Glu | Arg | Gly | Ala | Ile | Gln | Val | Gln | Leu | Arg | Val |
| | 1010 | | | | | 1015 | | | | | 1020 | | | | |
| Gly | Ala | Pro | Glu | Asn | Ser | Gly | Arg | Arg | Pro | Met | Ala | Leu | Tyr | Ser | Arg |
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| Pro | Glu | Gly | Ala | Ala | Glu | His | Asp | Trp | Thr | Arg | His | Ala | Thr | Gly | Arg |
| | | | 1045 | | | | | | 1050 | | | | | 1055 | |
| Leu | Ala | Pro | Gly | Arg | Gly | Glu | Ala | Ala | Gly | Asp | Leu | Ala | Asp | Trp | Pro |
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| Ala | Pro | Gly | Ala | Leu | Pro | Val | Asp | Leu | Asp | Glu | Phe | Tyr | Arg | Asp | Leu |
| | | 1075 | | | | | 1080 | | | | | 1085 | | | |
| Ala | Glu | Leu | Gly | Leu | Glu | Tyr | Gly | Pro | Ile | Phe | Gln | Gly | Leu | Lys | Ala |
| | 1090 | | | | | 1095 | | | | | 1100 | | | | |
| Ala | Trp | Arg | Gln | Gly | Asp | Glu | Val | Tyr | Ala | Glu | Ala | Ala | Leu | Pro | Gly |
| 105 | | | | | 1110 | | | | | 1115 | | | | | 1120 |
| Thr | Glu | Asp | Ser | Gly | Phe | Gly | Val | His | Pro | Ala | Leu | Leu | Asp | Ala | Ala |
| | | | 1125 | | | | | | 1130 | | | | | 1135 | |
| Leu | His | Ala | Thr | Ala | Val | Arg | Asp | Met | Asp | Asp | Ala | Arg | Leu | Pro | Phe |
| | | | 1140 | | | | | 1145 | | | | | 1150 | | |
| Gln | Trp | Glu | Gly | Val | Ser | Leu | His | Ala | Lys | Ala | Ala | Pro | Ala | Leu | Arg |
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| Val | Arg | Val | Val | Pro | Ala | Gly | Asp | Asp | Ala | Lys | Ser | Leu | Leu | Val | Cys |
| | 1170 | | | | | 1175 | | | | | 1180 | | | | |
| Asp | Gly | Thr | Gly | Arg | Pro | Val | Ile | Ser | Val | Asp | Arg | Leu | Val | Leu | Arg |

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 Ser Ala Ala Ala Arg Arg Thr Gly Ala Arg Arg Gln Ala His Gln Ala
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 Arg Leu Tyr Arg Leu Ser Trp Pro Thr Val Gln Leu Pro Thr Ser Ala
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 Gln Pro Pro Ser Cys Val Leu Leu Gly Thr Ser Glu Val Ser Ala Asp
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 Ile Gln Val Tyr Pro Asp Leu Arg Ser Leu Thr Ala Ala Leu Asp Ala
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 Gly Ala Glu Pro Pro Gly Val Val Ile Ala Pro Thr Pro Pro Gly Gly
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 Gly Arg Thr Ala Asp Val Arg Glu Thr Thr Arg His Ala Leu Asp Leu
 1285 1290 1295
 Val Gln Gly Trp Leu Ser Asp Gln Arg Leu Asn Glu Ser Arg Leu Leu
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 Asp Leu Ala Gln Ala Ala Leu Trp Gly Leu Leu Arg Ser Thr Gln Thr
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 Glu His Pro Asp Arg Phe Val Leu Val Asp Val Pro Glu Pro Ala Gln
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 Leu Leu Pro Ala Leu Pro Gly Val Leu Ala Cys Gly Glu Pro Gln Leu
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 Ala Leu Arg Arg Gly Gly Ala His Ala Pro Arg Leu Ala Gly Leu Gly
 1380 1385 1390
 Ser Asp Asp Val Leu Pro Val Pro Asp Gly Thr Gly Trp Arg Leu Glu
 1395 1400 1405
 Ala Thr Arg Pro Gly Ser Leu Asp Gly Leu Ala Leu Val Asp Glu Pro
 1410 1415 1420
 Thr Ala Thr Ala Pro Leu Gly Asp Gly Glu Val Arg Ile Ala Met Arg
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 Pro Gly Val Ala Ser Leu Gly Ser Glu Gly Ala Gly Val Val Val Glu
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 Thr Gly Pro Gly Val Thr Gly Leu Ala Pro Gly Asp Arg Val Met Gly
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 Met Ile Pro Lys Ala Phe Gly Pro Leu Ala Val Ala Asp His Arg Met
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 Pro Ile Val Phe Leu Thr Ala Tyr Tyr Ala Leu Val Asp Leu Ala Gly

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1530

1525 1535
Leu Arg Pro Gly Glu Ser Leu Leu Val His Ser Ala Ala Gly Gly Val
1540 1545 1550
Gly Met Ala Ala Ile Gln Leu Ala Arg His Leu Gly Ala Glu Val Tyr
1555 1560 1565
Ala Thr Ala Ser Glu Asp Lys Trp Gln Ala Val Glu Leu Ser Arg Glu
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His Leu Ala Ser Ser Arg Thr Cys Asp Phe Glu Gln Gln Phe Leu Gly
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Ala Thr Gly Gly Arg Gly Val Asp Val Val Leu Asn Ser Leu Ala Gly
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Glu Phe Ala Asp Ala Ser Leu Arg Met Leu Pro Arg Gly Gly Arg Phe
1620 1625 1630
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1650 1655 1660
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665 1670 1675 1680
Gly Arg Val Leu Glu Pro Leu Pro Val Thr Ala Trp Asp Val Arg Gln
1685 1690 1695
Ala Pro Glu Ala Leu Arg His Leu Ser Gln Ala Arg His Val Gly Lys
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1765 1770 1775
Gly Ala Glu Val Ser Leu Gln Ala Cys Asp Val Ala Asp Arg Glu Thr
1780 1785 1790
Leu Ala Lys Val Leu Ala Ser Ile Pro Asp Glu His Pro Leu Thr Ala
1795 1800 1805
Val Val His Ala Ala Gly Val Leu Asp Asp Gly Val Ser Glu Ser Leu
1810 1815 1820
Thr Val Glu Arg Leu Asp Gln Val Leu Arg Pro Lys Val Asp Gly Ala
825 1830 1835 1840
Arg Asn Leu Leu Glu Leu Ile Asp Pro Asp Val Ala Leu Val Leu Phe
1845 1850 1855
Ser Ser Val Ser Gly Val Leu Gly Ser Gly Gly Gln Gly Asn Tyr Ala

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1860 1865 1870
 Ala Ala Asn Ser Phe Leu Asp Ala Leu Ala Gln Gln Arg Gln Ser Arg
 1875 1880 1885
 Gly Leu Pro Thr Arg Ser Leu Ala Trp Gly Pro Trp Ala Glu His Gly
 1890 1895 1900
 Met Ala Ser Thr Leu Arg Glu Ala Glu Gln Asp Arg Leu Ala Arg Ser
 905 1910 1915 1920
 Gly Leu Leu Pro Ile Ser Thr Glu Glu Gly Leu Ser Gln Phe Asp Ala
 1925 1930 1935
 Ala Cys Gly Gly Ala His Thr Val Val Ala Pro Val Arg Phe Ser Arg
 1940 1945 1950
 Leu Ser Asp Gly Asn Ala Ile Lys Phe Ser Val Leu Gln Gly Leu Val
 1955 1960 1965
 Gly Pro His Arg Val Asn Lys Ala Ala Thr Ala Asp Asp Ala Glu Ser
 1970 1975 1980
 Leu Arg Lys Arg Leu Gly Arg Leu Pro Asp Ala Glu Gln His Arg Ile
 985 1990 1995 2000
 Leu Leu Asp Leu Val Arg Met His Val Ala Ala Val Leu Gly Phe Ala
 2005 2010 2015
 Gly Ser Gln Glu Ile Thr Ala Asp Gly Thr Phe Lys Val Leu Gly Phe
 2020 2025 2030
 Asp Ser Leu Thr Val Val Glu Leu Arg Asn Arg Ile Asn Gly Ala Thr
 2035 2040 2045
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 2050 2055 2060
 Ala Leu Ala Ala His Leu Val Thr Ala Leu Ser Ala Asp Arg Leu Ala
 065 2070 2075 2080
 Gly Thr Phe Glu Glu Leu Asp Arg Trp Ala Ala Asn Leu Pro Thr Leu
 2085 2090 2095
 Ala Arg Asp Glu Ala Thr Arg Ala Gln Ile Thr Thr Arg Leu Gln Ala
 2100 2105 2110
 Ile Leu Gln Ser Leu Ala Asp Val Ser Gly Gly Thr Gly Gly Gly Ser
 2115 2120 2125
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<213> Saccharopolyspora spinosa

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<220>

<221> CDS

<222> (1)..(9510)

<223> ORF20; polyketide synthase

<400> 45

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| Met | Ser | Asn | Glu | Glu | Lys | Leu | Arg | Glu | Tyr | Leu | Arg | Arg | Ala | Leu | Val | |
| 1 | | | | 5 | | | | | 10 | | | | | 15 | | |
| gat | ctg | cac | cag | gcg | cgc | gag | cgg | ctg | cac | gag | gcg | gag | tcg | gga | gag | 96 |
| Asp | Leu | His | Gln | Ala | Arg | Glu | Arg | Leu | His | Glu | Ala | Glu | Ser | Gly | Glu | |
| | | | 20 | | | | | 25 | | | | | 30 | | | |
| cgg | gaa | ccc | atc | gcg | atc | gtg | gcg | atg | ggc | tgc | cgg | tac | ccg | ggt | ggg | 144 |
| Arg | Glu | Pro | Ile | Ala | Ile | Val | Ala | Met | Gly | Cys | Arg | Tyr | Pro | Gly | Gly | |
| | | 35 | | | | | 40 | | | | | 45 | | | | |
| gtg | cag | gac | ccg | gaa | ggg | ctg | tgg | aaa | ctg | gtc | gcc | tcc | ggt | ggc | gac | 192 |
| Val | Gln | Asp | Pro | Glu | Gly | Leu | Trp | Lys | Leu | Val | Ala | Ser | Gly | Gly | Asp | |
| | 50 | | | | | 55 | | | | | 60 | | | | | |
| gcc | atc | ggt | gaa | ttc | ccc | gct | gat | cgt | ggt | tgg | cac | ctc | gac | gag | ctc | 240 |
| Ala | Ile | Gly | Glu | Phe | Pro | Ala | Asp | Arg | Gly | Trp | His | Leu | Asp | Glu | Leu | |
| 65 | | | | | 70 | | | | 75 | | | | | | 80 | |
| tac | gat | ccc | gac | ccg | gat | cag | ccc | gga | acc | tgc | tac | acc | cgg | cac | ggc | 288 |
| Tyr | Asp | Pro | Asp | Pro | Asp | Gln | Pro | Gly | Thr | Cys | Tyr | Thr | Arg | His | Gly | |
| | | | | 85 | | | | | 90 | | | | | 95 | | |
| ggc | ttc | ctc | cac | gac | gcc | ggc | gag | ttc | gac | gcg | gga | ttc | ttc | gac | atc | 336 |
| Gly | Phe | Leu | His | Asp | Ala | Gly | Glu | Phe | Asp | Ala | Gly | Phe | Phe | Asp | Ile | |
| | | | 100 | | | | | 105 | | | | | 110 | | | |
| agc | ccc | cgt | gag | gcg | ctc | gcg | atg | gac | ccg | cag | cag | cgg | ctg | ctg | ctg | 384 |
| Ser | Pro | Arg | Glu | Ala | Leu | Ala | Met | Asp | Pro | Gln | Gln | Arg | Leu | Leu | Leu | |
| | | 115 | | | | | 120 | | | | | 125 | | | | |
| gaa | atc | tcc | tgg | gag | acc | gtc | gaa | tcc | gct | ggg | atg | gac | ccg | agg | tcc | 432 |
| Glu | Ile | Ser | Trp | Glu | Thr | Val | Glu | Ser | Ala | Gly | Met | Asp | Pro | Arg | Ser | |
| | 130 | | | | | 135 | | | | | 140 | | | | | |
| ttg | cgg | ggg | agc | cgc | acc | ggg | gtg | ttc | gcg | gga | ttg | atg | tac | gag | ggc | 480 |
| Leu | Arg | Gly | Ser | Arg | Thr | Gly | Val | Phe | Ala | Gly | Leu | Met | Tyr | Glu | Gly | |
| 145 | | | | | 150 | | | | | 155 | | | | | 160 | |
| tat | gac | acc | ggc | gcc | cac | cgg | gca | gga | gaa | ggt | gtc | gaa | ggc | tat | ctc | 528 |
| Tyr | Asp | Thr | Gly | Ala | His | Arg | Ala | Gly | Glu | Gly | Val | Glu | Gly | Tyr | Leu | |
| | | | | 165 | | | | | 170 | | | | | 175 | | |
| gga | acc | ggc | aat | gcg | gga | agc | gtc | gcc | tct | ggt | cgg | gtt | gcg | tat | gcg | 576 |
| Gly | Thr | Gly | Asn | Ala | Gly | Ser | Val | Ala | Ser | Gly | Arg | Val | Ala | Tyr | Ala | |
| | | | 180 | | | | | 185 | | | | | 190 | | | |
| ttc | ggg | ttc | gag | ggc | cca | gcg | gtg | acg | gta | gac | acg | gcg | tgc | tcg | tcg | 624 |
| Phe | Gly | Phe | Glu | Gly | Pro | Ala | Val | Thr | Val | Asp | Thr | Ala | Cys | Ser | Ser | |
| | | 195 | | | | | 200 | | | | | 205 | | | | |
| tcg | ttg | gtg | gcg | ctg | cat | ttg | gcg | tgt | cag | tcg | ttg | cgg | cag | ggc | gag | 672 |
| Ser | Leu | Val | Ala | Leu | His | Leu | Ala | Cys | Gln | Ser | Leu | Arg | Gln | Gly | Glu | |
| | 210 | | | | | 215 | | | | | 220 | | | | | |
| tgt | gat | ctg | gcg | ctg | gcc | ggt | gga | gtg | acg | gtg | atg | tcg | acg | ccg | gag | 720 |

| LeA33955-US | | | | | | | | | | | | | | | |
|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
| Cys 225 | Asp | Leu | Ala | Leu | Ala 230 | Gly | Gly | Val | Thr | Val 235 | Met | Ser | Thr | Pro | Glu 240 |
| agg Arg | ttc Phe | gtg Val | gag Glu | ttc Phe 245 | tcc Ser | cgt Arg | cag Gln | cgt Arg | ggg Gly 250 | ctc Leu | gca Ala | ccg Pro | gat Asp | ggg Gly 255 | cgg Arg |
| 768 | | | | | | | | | | | | | | | |
| tgt Cys | aag Lys | tcg Ser | ttc Phe 260 | gcg Ala | gcg Ala | gct Ala | gcg Ala | gat Asp 265 | gga Gly | acc Thr | ggg Gly | tgg Trp | ggg Gly 270 | gag Glu | ggg Gly |
| 816 | | | | | | | | | | | | | | | |
| gcc Ala | ggg Gly | ttg Leu 275 | gtg Val | ttg Leu | ctg Leu | gag Glu | cgg Arg 280 | ctg Leu | tca Ser | gac Asp | gcc Ala | agg Arg 285 | cgg Arg | aac Asn | ggg Gly |
| 864 | | | | | | | | | | | | | | | |
| cat His | cgg Arg 290 | gta Val | ctg Leu | gcg Ala | gtt Val | gtt Val 295 | cgt Arg | ggg Gly | agc Ser | gcg Ala | gtg Val 300 | aat Asn | cag Gln | gac Asp | ggg Gly |
| 912 | | | | | | | | | | | | | | | |
| gcg Ala 305 | tcg Ser | aac Asn | gga Gly | ttg Leu | acg Thr 310 | gcc Ala | ccg Pro | aac Asn | ggg Gly | ctg Leu 315 | gcc Ala | cag Gln | gag Glu | cgg Arg | gtc Val 320 |
| 960 | | | | | | | | | | | | | | | |
| att Ile | cag Gln | cag Gln | gtg Val | ctc Leu 325 | acg Thr | agt Ser | gcg Ala | ggg Gly | ctg Leu 330 | tcg Ser | gcg Ala | tcc Ser | gat Asp | gtg Val 335 | gac Asp |
| 1008 | | | | | | | | | | | | | | | |
| gct Ala | gtg Val | gag Glu | gcg Ala 340 | cat His | gga Gly | acg Thr | ggg Gly | acg Thr 345 | cgg Arg | ctt Leu | ggg Gly | gat Asp | ccg Pro 350 | atc Ile | gag Glu |
| 1056 | | | | | | | | | | | | | | | |
| gcg Ala | cag Gln | gct Ala 355 | ctg Leu | ata Ile | gcc Ala | gcc Ala | tat Tyr 360 | gga Gly | cag Gln | gat Asp | cgg Arg | gac Asp 365 | cgg Arg | gac Asp | cgg Arg |
| 1104 | | | | | | | | | | | | | | | |
| ccg Pro | ctg Leu 370 | tgg Trp | ttg Leu | ggg Gly | tcg Ser | gtc Val 375 | aag Lys | tcc Ser | aac Asn | atc Ile | ggg Gly 380 | cat His | acg Thr | cag Gln | gcg Ala |
| 1152 | | | | | | | | | | | | | | | |
| gct Ala 385 | gcg Ala | ggc Gly | gtc Val | gct Ala | ggg Gly 390 | gtg Val | atc Ile | aag Lys | atg Met | gtc Val 395 | atg Met | gcg Ala | atg Met | cgg Arg | cac His 400 |
| 1200 | | | | | | | | | | | | | | | |
| ggg Gly | gag Glu | ctg Leu | ccg Pro | cgc Arg 405 | acg Thr | ttg Leu | cac His | gtg Val | gac Asp 410 | gag Glu | ccg Pro | aac Asn | tcg Ser | cac His 415 | gtg Val |
| 1248 | | | | | | | | | | | | | | | |
| gac Asp | tgg Trp | tcg Ser | gct Ala 420 | ggg Gly | gcg Ala | gtc Val | cga Arg | ctc Leu 425 | ctg Leu | acc Thr | gag Glu | aac Asn | atc Ile 430 | cgc Arg | tgg Trp |
| 1296 | | | | | | | | | | | | | | | |
| cca Pro | ggg Gly | acg Thr 435 | ggg Gly | acg Thr | cgc Arg | cgc Arg | gct Ala 440 | gga Gly | gtg Val | tcg Ser | tcg Ser | ttc Phe 445 | ggg Gly | gta Val | agc Ser |
| 1344 | | | | | | | | | | | | | | | |
| ggg Gly | acc Thr 450 | aac Asn | gca Ala | cac His | gtc Val | atc Ile 455 | ctc Leu | gaa Glu | cac His | gac Asp | ccg Pro 460 | ctc Leu | gcc Ala | gtg Val | acc Thr |
| 1392 | | | | | | | | | | | | | | | |
| gag Glu 465 | aac Asn | gag Glu | gaa Glu | gca Ala | gcg Ala 470 | cag Gln | tcc Ser | cca Pro | gca Ala | cct Pro 475 | ggg Gly | atc Ile | gtg Val | ccc Pro | tgg Trp 480 |
| 1440 | | | | | | | | | | | | | | | |

| LeA33955-US | | | | | | | | | | | | | | | | |
|-------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|
| gcg | ttg | tcc | ggg | cgg | tcg | tcg | acg | gcg | ctg | cgg | gcc | cag | gcc | gaa | cgg | |
| Ala | Leu | Ser | Gly | Arg | Ser | Ser | Thr | Ala | Leu | Arg | Ala | Gln | Ala | Glu | Arg | 1488 |
| | | | | 485 | | | | | 490 | | | | | 495 | | |
| ctg | cgc | gag | ctg | tgc | gag | cag | acc | gat | ccc | gac | ccc | gtc | gat | gtc | ggc | 1536 |
| Leu | Arg | Glu | Leu | Cys | Glu | Gln | Thr | Asp | Pro | Asp | Pro | Val | Asp | Val | Gly | |
| | | | 500 | | | | | 505 | | | | | 510 | | | |
| ttc | tca | ctg | gcc | gcc | acg | cgc | acg | gct | tgg | gag | cac | cga | gcg | gtg | gtg | 1584 |
| Phe | Ser | Leu | Ala | Ala | Thr | Arg | Thr | Ala | Trp | Glu | His | Arg | Ala | Val | Val | |
| | | 515 | | | | | 520 | | | | | 525 | | | | |
| ctt | ggc | cgg | gac | agc | gct | acg | ttg | cgc | tcc | ggg | ctt | ggc | gtt | gtt | gcc | 1632 |
| Leu | Gly | Arg | Asp | Ser | Ala | Thr | Leu | Arg | Ser | Gly | Leu | Gly | Val | Val | Ala | |
| | 530 | | | | | 535 | | | | | 540 | | | | | |
| agc | ggc | gaa | cca | gcg | gtc | gat | gtc | gtt | gag | ggg | agc | gtc | ctg | gac | ggc | 1680 |
| Ser | Gly | Glu | Pro | Ala | Val | Asp | Val | Val | Glu | Gly | Ser | Val | Leu | Asp | Gly | |
| 545 | | | | 550 | | | | | 555 | | | | | | 560 | |
| gag | gtc | gtc | ttc | gtc | ttc | ccc | ggc | cag | ggc | tgg | cag | tgg | gcc | ggc | atg | 1728 |
| Glu | Val | Val | Phe | Val | Phe | Pro | Gly | Gln | Gly | Trp | Gln | Trp | Ala | Gly | Met | |
| | | | 565 | | | | 570 | | | | | | | 575 | | |
| gca | gtc | gac | ctg | ctg | gac | gct | tcg | ccg | acg | ttc | gcg | cgc | cac | atg | gac | 1776 |
| Ala | Val | Asp | Leu | Leu | Asp | Ala | Ser | Pro | Thr | Phe | Ala | Arg | His | Met | Asp | |
| | | | 580 | | | | | 585 | | | | | 590 | | | |
| gag | tgc | gcc | acc | gcg | ctg | cgg | agg | tac | gtg | gac | tgg | tcg | ttg | gtc | gac | 1824 |
| Glu | Cys | Ala | Thr | Ala | Leu | Arg | Arg | Tyr | Val | Asp | Trp | Ser | Leu | Val | Asp | |
| | | 595 | | | | | 600 | | | | | 605 | | | | |
| gtg | ctg | cgc | gga | gcg | gag | aac | tcc | cca | ccg | ctg | gac | cgg | gtg | gac | gtg | 1872 |
| Val | Leu | Arg | Gly | Ala | Glu | Asn | Ser | Pro | Pro | Leu | Asp | Arg | Val | Asp | Val | |
| | 610 | | | | | 615 | | | | | 620 | | | | | |
| ctc | cag | ccc | gcg | tcc | ttc | gcg | gtg | atg | gtg | tcg | ctc | gcc | gag | gtg | tgg | 1920 |
| Leu | Gln | Pro | Ala | Ser | Phe | Ala | Val | Met | Val | Ser | Leu | Ala | Glu | Val | Trp | |
| | | | | 630 | | | | | 635 | | | | | | 640 | |
| cgt | tcc | tac | ggg | gtg | agg | ccg | gcg | gcc | gtc | gtc | ggc | cac | agt | caa | ggc | 1968 |
| Arg | Ser | Tyr | Gly | Val | Arg | Pro | Ala | Ala | Val | Val | Gly | His | Ser | Gln | Gly | |
| | | | 645 | | | | | 650 | | | | | 655 | | | |
| gaa | atc | gcc | gcg | gcc | tgc | gca | gcc | ggg | gtg | ctg | ccg | ctg | gag | gat | gcg | 2016 |
| Glu | Ile | Ala | Ala | Ala | Cys | Ala | Ala | Gly | Val | Leu | Pro | Leu | Glu | Asp | Ala | |
| | | | 660 | | | | | 665 | | | | | 670 | | | |
| gcc | agg | ctt | gtc | gca | ttg | cgc | agc | aga | gcg | ttg | aag | gga | ctt | tcg | ggg | 2064 |
| Ala | Arg | Leu | Val | Ala | Leu | Arg | Ser | Arg | Ala | Leu | Lys | Gly | Leu | Ser | Gly | |
| | | 675 | | | | | 680 | | | | | 685 | | | | |
| cgg | ggc | ggc | atg | gcg | tcg | ctg | gcc | tgc | cct | gcg | gat | gag | gtc | gcg | gca | 2112 |
| Arg | Gly | Gly | Met | Ala | Ser | Leu | Ala | Cys | Pro | Ala | Asp | Glu | Val | Ala | Ala | |
| | 690 | | | | | 695 | | | | | 700 | | | | | |
| ttg | ttc | gcg | gga | tcg | ggc | ggc | cgt | ctg | gaa | gtt | gcg | gcg | atc | aac | ggc | 2160 |
| Leu | Phe | Ala | Gly | Ser | Gly | Gly | Arg | Leu | Glu | Val | Ala | Ala | Ile | Asn | Gly | |
| | 705 | | | | 710 | | | | | 715 | | | | | 720 | |
| ccg | cga | tcg | gtc | gtg | gtg | tcc | ggc | gat | ctg | gaa | gcg | gtg | gac | gaa | ctg | 2208 |
| Pro | Arg | Ser | Val | Val | Val | Ser | Gly | Asp | Leu | Glu | Ala | Val | Asp | Glu | Leu | |
| | | | | 725 | | | | | 730 | | | | | 735 | | |

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| | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|
| ctg | gca | gag | tgc | gct | gaa | aag | gac | atg | cgt | gca | cgc | cgt | atc | ccc | gtc | 2256 |
| Leu | Ala | Glu | Cys | Ala | Glu | Lys | Asp | Met | Arg | Ala | Arg | Arg | Ile | Pro | Val | |
| | | | 740 | | | | | 745 | | | | | 750 | | | |
| gac | tac | gcc | tcg | cat | tca | gcg | cac | gtg | gag | gtg | gtt | cgg | agc | ccg | gtg | 2304 |
| Asp | Tyr | Ala | Ser | His | Ser | Ala | His | Val | Glu | Val | Val | Arg | Ser | Pro | Val | |
| | | 755 | | | | | 760 | | | | | 765 | | | | |
| ctg | gcg | gcc | gcc | gcc | ggg | gtg | cga | cac | cgg | gac | ggc | cag | gtg | ccg | tgg | 2352 |
| Leu | Ala | Ala | Ala | Ala | Gly | Val | Arg | His | Arg | Asp | Gly | Gln | Val | Pro | Trp | |
| | 770 | | | | | 775 | | | | | 780 | | | | | |
| tgg | tcg | acg | gtg | atc | ggc | gac | tgg | gtg | gat | ccg | gcc | agg | ctg | gac | ggc | 2400 |
| Trp | Ser | Thr | Val | Ile | Gly | Asp | Trp | Val | Asp | Pro | Ala | Arg | Leu | Asp | Gly | |
| | 785 | | | | 790 | | | | | 795 | | | | | 800 | |
| gag | tat | tgg | tat | cgg | aac | ctc | cgg | cag | ccg | gtc | cgg | ttc | gaa | cac | gcc | 2448 |
| Glu | Tyr | Trp | Tyr | Arg | Asn | Leu | Arg | Gln | Pro | Val | Arg | Phe | Glu | His | Ala | |
| | | | | 805 | | | | | 810 | | | | | 815 | | |
| gtg | cag | ggc | ctg | gtc | gag | cgg | gga | ttc | ggc | ctg | ttc | atc | gaa | atg | agt | 2496 |
| Val | Gln | Gly | Leu | Val | Glu | Arg | Gly | Phe | Gly | Leu | Phe | Ile | Glu | Met | Ser | |
| | | | 820 | | | | | 825 | | | | | 830 | | | |
| gcg | cat | ccg | gtg | ctg | acc | acg | gcg | gtc | gag | gaa | acc | ggt | gcg | gag | tcg | 2544 |
| Ala | His | Pro | Val | Leu | Thr | Thr | Ala | Val | Glu | Glu | Thr | Gly | Ala | Glu | Ser | |
| | | 835 | | | | | 840 | | | | | 845 | | | | |
| gag | acc | gcc | gtg | gcc | gcg | gta | ggt | acc | ttg | cga | cgt | gac | tcg | ggc | ggc | 2592 |
| Glu | Thr | Ala | Val | Ala | Ala | Val | Gly | Thr | Leu | Arg | Arg | Asp | Ser | Gly | Gly | |
| | 850 | | | | | 855 | | | | | 860 | | | | | |
| ctc | cgg | agg | ttg | ttg | cat | tcg | ctg | gcc | gag | gcg | tac | gtg | cgc | ggc | gcc | 2640 |
| Leu | Arg | Arg | Leu | Leu | His | Ser | Leu | Ala | Glu | Ala | Tyr | Val | Arg | Gly | Ala | |
| | | | | | 870 | | | | | 875 | | | | | 880 | |
| acc | gtg | gac | tgg | gcc | gtg | gcg | ttc | ggg | ggc | gcg | ggc | cga | cgg | ctg | gac | 2688 |
| Thr | Val | Asp | Trp | Ala | Val | Ala | Phe | Gly | Gly | Ala | Gly | Arg | Arg | Leu | Asp | |
| | | | | 885 | | | | | 890 | | | | | 895 | | |
| ctg | ccg | acc | tac | ccg | ttc | cag | cgc | cag | cgg | tac | tgg | ctg | gac | aag | gga | 2736 |
| Leu | Pro | Thr | Tyr | Pro | Phe | Gln | Arg | Gln | Arg | Tyr | Trp | Leu | Asp | Lys | Gly | |
| | | | 900 | | | | | 905 | | | | | 910 | | | |
| gct | gcc | tcc | gac | gag | gct | cgt | gcg | gtc | tcg | gac | ccg | gcg | gcg | ggc | tgg | 2784 |
| Ala | Ala | Ser | Asp | Glu | Ala | Arg | Ala | Val | Ser | Asp | Pro | Ala | Ala | Gly | Trp | |
| | | 915 | | | | | 920 | | | | | 925 | | | | |
| ttc | tgg | caa | gcc | gtg | gcg | cgc | caa | gac | ctg | aaa | agc | gtg | tcc | gat | gcc | 2832 |
| Phe | Trp | Gln | Ala | Val | Ala | Arg | Gln | Asp | Leu | Lys | Ser | Val | Ser | Asp | Ala | |
| | 930 | | | | | 935 | | | | | 940 | | | | | |
| ctc | gat | ctc | gac | gcc | gac | gca | ccg | ctg | agc | gca | aca | ctt | cca | gcc | ctg | 2880 |
| Leu | Asp | Leu | Asp | Ala | Asp | Ala | Pro | Leu | Ser | Ala | Thr | Leu | Pro | Ala | Leu | |
| | 945 | | | | 950 | | | | | 955 | | | | | 960 | |
| tcc | gtc | tgg | cac | cgt | cag | gaa | cga | gaa | agg | gtc | ttg | gca | gac | ggt | tgg | 2928 |
| Ser | Val | Trp | His | Arg | Gln | Glu | Arg | Glu | Arg | Val | Leu | Ala | Asp | Gly | Trp | |
| | | | | 965 | | | | | 970 | | | | | 975 | | |
| cgg | tac | cga | gtc | gac | tgg | gta | cgg | gtg | gcc | ccg | cag | ccg | gtc | cgg | aga | 2976 |
| Arg | Tyr | Arg | Val | Asp | Trp | Val | Arg | Val | Ala | Pro | Gln | Pro | Val | Arg | Arg | |

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| 980 | | | | | | | | | | 985 | | | | | | | | | | 990 | | | | | | | | | | |
|-----|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|--|--|--|-----|--|--|--|--|--|--|--|--|--|--|
| acg | cgg | gaa | acc | tgg | ctc | ctg | gtc | gtt | ccc | ccg | ggc | ggc | atc | gag | gaa | 3024 | | | | | | | | | | | | | | |
| Thr | Arg | Glu | Thr | Trp | Leu | Leu | Val | Val | Pro | Pro | Gly | Gly | Ile | Glu | Glu | | | | | | | | | | | | | | | |
| | | 995 | | | | | 1000 | | | | | 1005 | | | | | | | | | | | | | | | | | | |
| gcg | ctg | gtc | gaa | cgg | ctg | acg | gat | gcg | ttg | aac | acg | cga | ggg | atc | agc | 3072 | | | | | | | | | | | | | | |
| Ala | Leu | Val | Glu | Arg | Leu | Thr | Asp | Ala | Leu | Asn | Thr | Arg | Gly | Ile | Ser | | | | | | | | | | | | | | | |
| | 1010 | | | | | 1015 | | | | | 1020 | | | | | | | | | | | | | | | | | | | |
| acc | ctg | cgc | ctc | gac | gtg | cca | ccg | gcg | gcg | acc | agt | ggc | gaa | ctc | gca | 3120 | | | | | | | | | | | | | | |
| Thr | Leu | Arg | Leu | Asp | Val | Pro | Pro | Ala | Ala | Thr | Ser | Gly | Glu | Leu | Ala | | | | | | | | | | | | | | | |
| | 1025 | | | | 1030 | | | | | 1035 | | | | | 1040 | | | | | | | | | | | | | | | |
| acc | gaa | ctc | cgc | gcc | gca | gcc | gac | ggg | gac | ccg | gtg | aag | gca | atc | ctg | 3168 | | | | | | | | | | | | | | |
| Thr | Glu | Leu | Arg | Ala | Ala | Ala | Asp | Gly | Asp | Pro | Val | Lys | Ala | Ile | Leu | | | | | | | | | | | | | | | |
| | | | | 1045 | | | | 1050 | | | | | | 1055 | | | | | | | | | | | | | | | | |
| tcg | ctc | acc | gcg | ttg | gac | gag | cga | ccc | cac | ccc | gaa | tgc | aag | gac | gtc | 3216 | | | | | | | | | | | | | | |
| Ser | Leu | Thr | Ala | Leu | Asp | Glu | Arg | Pro | His | Pro | Glu | Cys | Lys | Asp | Val | | | | | | | | | | | | | | | |
| | | | 1060 | | | | | 1065 | | | | | 1070 | | | | | | | | | | | | | | | | | |
| ccg | agc | ggg | att | gcc | ttg | ctg | ctg | aac | ctg | gtc | aag | gcg | ctc | ggg | gaa | 3264 | | | | | | | | | | | | | | |
| Pro | Ser | Gly | Ile | Ala | Leu | Leu | Leu | Asn | Leu | Val | Lys | Ala | Leu | Gly | Glu | | | | | | | | | | | | | | | |
| | | 1075 | | | | | 1080 | | | | | 1085 | | | | | | | | | | | | | | | | | | |
| gcc | gac | ctc | aga | att | cct | ctg | tgg | acc | atc | acg | cgt | ggg | gcg | gtc | aag | 3312 | | | | | | | | | | | | | | |
| Ala | Asp | Leu | Arg | Ile | Pro | Leu | Trp | Thr | Ile | Thr | Arg | Gly | Ala | Val | Lys | | | | | | | | | | | | | | | |
| | 1090 | | | | | 1095 | | | | | 1100 | | | | | | | | | | | | | | | | | | | |
| gca | ggc | ccc | gca | gat | cgg | ctg | ctg | cgc | ccg | atg | cag | gcg | caa | gca | tgg | 3360 | | | | | | | | | | | | | | |
| Ala | Gly | Pro | Ala | Asp | Arg | Leu | Leu | Arg | Pro | Met | Gln | Ala | Gln | Ala | Trp | | | | | | | | | | | | | | | |
| | 1105 | | | | 1110 | | | | | 1115 | | | | | 1120 | | | | | | | | | | | | | | | |
| ggg | ctg | ggg | cga | gta | gcc | gca | ctc | gaa | cac | ccc | gag | cgc | tgg | ggg | ggg | 3408 | | | | | | | | | | | | | | |
| Gly | Leu | Gly | Arg | Val | Ala | Ala | Leu | Glu | His | Pro | Glu | Arg | Trp | Gly | Gly | | | | | | | | | | | | | | | |
| | | | | 1125 | | | | | 1130 | | | | | 1135 | | | | | | | | | | | | | | | | |
| ctg | atc | gac | ctg | ccg | gat | tcg | ctg | gac | ggc | gac | gtc | ctc | acg | agg | ctg | 3456 | | | | | | | | | | | | | | |
| Leu | Ile | Asp | Leu | Pro | Asp | Ser | Leu | Asp | Gly | Asp | Val | Leu | Thr | Arg | Leu | | | | | | | | | | | | | | | |
| | | | 1140 | | | | | 1145 | | | | | 1150 | | | | | | | | | | | | | | | | | |
| ggc | gaa | gcg | ctc | acc | aac | ggc | ttg | gcg | gaa | gac | caa | ctg | gcg | att | cgc | 3504 | | | | | | | | | | | | | | |
| Gly | Glu | Ala | Leu | Thr | Asn | Gly | Leu | Ala | Glu | Asp | Gln | Leu | Ala | Ile | Arg | | | | | | | | | | | | | | | |
| | | 1155 | | | | | 1160 | | | | | 1165 | | | | | | | | | | | | | | | | | | |
| cag | tcg | ggc | gtg | ctg | gcc | cgg | cga | ctg | gta | ccc | gcc | ccg | gcg | aat | cag | 3552 | | | | | | | | | | | | | | |
| Gln | Ser | Gly | Val | Leu | Ala | Arg | Arg | Leu | Val | Pro | Ala | Pro | Ala | Asn | Gln | | | | | | | | | | | | | | | |
| | 1170 | | | | | 1175 | | | | | 1180 | | | | | | | | | | | | | | | | | | | |
| ccc | gct | gga | cgt | aag | tgg | cgc | ccc | cga | ggg | agc | gcg | ctg | atc | acg | ggc | 3600 | | | | | | | | | | | | | | |
| Pro | Ala | Gly | Arg | Lys | Trp | Arg | Pro | Arg | Gly | Ser | Ala | Leu | Ile | Thr | Gly | | | | | | | | | | | | | | | |
| | 1185 | | | | 1190 | | | | | 1195 | | | | | 1200 | | | | | | | | | | | | | | | |
| gga | ctc | ggc | gcg | gtg | ggc | gca | cag | gtg | gcg | agg | tgg | ttg | gcc | gaa | atc | 3648 | | | | | | | | | | | | | | |
| Gly | Leu | Gly | Ala | Val | Gly | Ala | Gln | Val | Ala | Arg | Trp | Leu | Ala | Glu | Ile | | | | | | | | | | | | | | | |
| | | | | 1205 | | | | | 1210 | | | | | 1215 | | | | | | | | | | | | | | | | |
| gga | gcc | gag | cga | atc | gtg | ctc | acc | agt | cga | cgg | ggc | aac | caa | gca | gca | 3696 | | | | | | | | | | | | | | |
| Gly | Ala | Glu | Arg | Ile | Val | Leu | Thr | Ser | Arg | Arg | Gly | Asn | Gln | Ala | Ala | | | | | | | | | | | | | | | |
| | | | 1220 | | | | | 1225 | | | | | 1230 | | | | | | | | | | | | | | | | | |
| ggc | gcc | gcc | gag | ctg | gaa | gcc | gaa | ctc | cgg | gcc | ctt | gga | gcg | caa | gtg | 3744 | | | | | | | | | | | | | | |

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|-----|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|--|
| Gly | Ala | Ala | Glu | Leu | Glu | Ala | Glu | Leu | Arg | Ala | Leu | Gly | Ala | Gln | Val | | |
| | 1235 | | | | | | 1240 | | | | | 1245 | | | | | |
| tcc | atc | gtg | gct | tgc | gac | gtg | acc | gat | cgt | gcc | gag | atg | tcc | gca | cta | 3792 | |
| Ser | Ile | Val | Ala | Cys | Asp | Val | Thr | Asp | Arg | Ala | Glu | Met | Ser | Ala | Leu | | |
| | 1250 | | | | | 1255 | | | | | 1260 | | | | | | |
| ctg | gcc | gag | ttc | gac | gtc | acc | gcg | gtg | ttc | cac | gcg | gcc | gga | gtc | ggc | 3840 | |
| Leu | Ala | Glu | Phe | Asp | Val | Thr | Ala | Val | Phe | His | Ala | Ala | Gly | Val | Gly | | |
| | 1265 | | | | 1270 | | | | | 1275 | | | | | 1280 | | |
| cgg | ctg | ctg | ccg | ttg | gcg | gag | acc | gac | cag | aac | ggc | ctg | gcc | gaa | ata | 3888 | |
| Arg | Leu | Leu | Pro | Leu | Ala | Glu | Thr | Asp | Gln | Asn | Gly | Leu | Ala | Glu | Ile | | |
| | | | | 1285 | | | | | 1290 | | | | | 1295 | | | |
| tgc | gcg | gcg | aag | gtc | cgc | ggc | gct | cag | gtg | ctg | gac | gaa | ctg | tgc | gac | 3936 | |
| Cys | Ala | Ala | Lys | Val | Arg | Gly | Ala | Gln | Val | Leu | Asp | Glu | Leu | Cys | Asp | | |
| | | | 1300 | | | | | 1305 | | | | | 1310 | | | | |
| agc | acc | gat | ctc | gat | gcc | ttc | gtc | ctg | ttc | tcc | tcg | ggc | gcc | ggg | gta | 3984 | |
| Ser | Thr | Asp | Leu | Asp | Ala | Phe | Val | Leu | Phe | Ser | Ser | Gly | Ala | Gly | Val | | |
| | | 1315 | | | | | 1320 | | | | | 1325 | | | | | |
| tgg | ggc | ggg | ggc | ggc | cag | ggc | gct | tac | ggc | gcg | gcg | aac | gca | ttc | ttg | 4032 | |
| Trp | Gly | Gly | Gly | Gly | Gln | Gly | Ala | Tyr | Gly | Ala | Ala | Asn | Ala | Phe | Leu | | |
| | 1330 | | | | | 1335 | | | | | 1340 | | | | | | |
| gac | aca | ctc | gcc | gaa | caa | cgc | cga | gca | cgc | ggc | ctg | ccg | gca | acc | tcg | 4080 | |
| Asp | Thr | Leu | Ala | Glu | Gln | Arg | Arg | Ala | Arg | Gly | Leu | Pro | Ala | Thr | Ser | | |
| | 1345 | | | | 1350 | | | | | 1355 | | | | | 1360 | | |
| atc | tcc | tgg | ggc | agt | tgg | gcc | ggc | ggc | ggc | atg | gcc | gac | ggc | gcg | gcg | 4128 | |
| Ile | Ser | Trp | Gly | Ser | Trp | Ala | Gly | Gly | Gly | Met | Ala | Asp | Gly | Ala | Ala | | |
| | | | | 1365 | | | | | 1370 | | | | | 1375 | | | |
| ggc | gaa | cac | ctg | cgg | cga | cgc | ggg | ata | cgt | ccg | atg | ccg | gcg | gcg | tcg | 4176 | |
| Gly | Glu | His | Leu | Arg | Arg | Arg | Gly | Ile | Arg | Pro | Met | Pro | Ala | Ala | Ser | | |
| | | | 1380 | | | | | 1385 | | | | | 1390 | | | | |
| gcc | atc | ctg | gct | ctg | cag | gaa | gta | ctt | gac | cag | gat | gag | acg | tgc | gtg | 4224 | |
| Ala | Ile | Leu | Ala | Leu | Gln | Glu | Val | Leu | Asp | Gln | Asp | Glu | Thr | Cys | Val | | |
| | | 1395 | | | | | 1400 | | | | | 1405 | | | | | |
| tcg | atc | gct | gat | gtg | gac | tgg | gac | cga | ttc | gtt | ccc | acg | ttc | gcc | gcg | 4272 | |
| Ser | Ile | Ala | Asp | Val | Asp | Trp | Asp | Arg | Phe | Val | Pro | Thr | Phe | Ala | Ala | | |
| | 1410 | | | | | 1415 | | | | | 1420 | | | | | | |
| act | cgc | gcc | acc | cgg | ttg | ttc | gac | gaa | gtg | ccg | gcg | gcg | aga | aag | gcg | 4320 | |
| Thr | Arg | Ala | Thr | Arg | Leu | Phe | Asp | Glu | Val | Pro | Ala | Ala | Arg | Lys | Ala | | |
| | 1425 | | | | 1430 | | | | | 1435 | | | | | 1440 | | |
| atg | ccc | gcg | aat | ggg | ccg | gca | gaa | cca | ggc | ggc | tcg | ccg | ttc | gcc | cgc | 4368 | |
| Met | Pro | Ala | Asn | Gly | Pro | Ala | Glu | Pro | Gly | Gly | Ser | Pro | Phe | Ala | Arg | | |
| | | | | 1445 | | | | | 1450 | | | | | 1455 | | | |
| aat | ctc | gcg | gag | ctg | ccg | gaa | gcc | caa | cga | cgc | cac | gaa | ctg | gtg | gat | 4416 | |
| Asn | Leu | Ala | Glu | Leu | Pro | Glu | Ala | Gln | Arg | Arg | His | Glu | Leu | Val | Asp | | |
| | | | 1460 | | | | | 1465 | | | | | 1470 | | | | |
| ctg | gtg | tgc | gcc | cag | gtg | gca | acc | gtg | ctc | ggg | cac | ggc | agt | cgc | gag | 4464 | |
| Leu | Val | Cys | Ala | Gln | Val | Ala | Thr | Val | Leu | Gly | His | Gly | Ser | Arg | Glu | | |
| | 1475 | | | | | | 1480 | | | | | 1485 | | | | | |

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|---|------|
| gaa gtc cag ccc gag cgg gcg ttc cgc gcg ctc ggg ttc gac tcc ctc | 4512 |
| Glu Val Gln Pro Glu Arg Ala Phe Arg Ala Leu Gly Phe Asp Ser Leu | |
| 1490 1495 1500 | |
| atg gcg gtg gat ctg cgc aat cgt ttg acc acc gcc acc ggg ttg cgc | 4560 |
| Met Ala Val Asp Leu Arg Asn Arg Leu Thr Thr Ala Thr Gly Leu Arg | |
| 1505 1510 1515 1520 | |
| ctg ccg acc aca acc gtc ttc gac tac ccg aat ccg gcc gcc ttg gcc | 4608 |
| Leu Pro Thr Thr Thr Val Phe Asp Tyr Pro Asn Pro Ala Ala Leu Ala | |
| 1525 1530 1535 | |
| gct cac ctg ctc gag gag ctg gtg ggt gat gtc gcg tcg gct gcg gtg | 4656 |
| Ala His Leu Leu Glu Glu Leu Val Gly Asp Val Ala Ser Ala Ala Val | |
| 1540 1545 1550 | |
| acc gct gcc agc gcg ccc gcg agt gac gaa ccg atc gcg atc gtc gcg | 4704 |
| Thr Ala Ala Ser Ala Pro Ala Ser Asp Glu Pro Ile Ala Ile Val Ala | |
| 1555 1560 1565 | |
| atg agc tgc cgg ttt ccg ggt ggc gcg cac tcg ccg gaa gac ctg tgg | 4752 |
| Met Ser Cys Arg Phe Pro Gly Gly Ala His Ser Pro Glu Asp Leu Trp | |
| 1570 1575 1580 | |
| cgg ctg gtc gcc gcc ggc acg gag gtg atc ggc gag ttc ccc tcc gac | 4800 |
| Arg Leu Val Ala Ala Gly Thr Glu Val Ile Gly Glu Phe Pro Ser Asp | |
| 1585 1590 1595 1600 | |
| cgg ggc tgg gat gcg gaa ggc ctt tac gat ccg gat gct tcc agg cct | 4848 |
| Arg Gly Trp Asp Ala Glu Gly Leu Tyr Asp Pro Asp Ala Ser Arg Pro | |
| 1605 1610 1615 | |
| gga acg acg tat gcg cgg atg gcg gga ttc ctc tac gac gcc ggt gag | 4896 |
| Gly Thr Thr Tyr Ala Arg Met Ala Gly Phe Leu Tyr Asp Ala Gly Glu | |
| 1620 1625 1630 | |
| ttc gat gcc gac ctg ttc ggc atc agc cca cgt gag gcg ttg gcg atg | 4944 |
| Phe Asp Ala Asp Leu Phe Gly Ile Ser Pro Arg Glu Ala Leu Ala Met | |
| 1635 1640 1645 | |
| gat ccg cag cag cgg ttg gtg ctc gaa atc gcc tgg gaa gcc ctc gaa | 4992 |
| Asp Pro Gln Gln Arg Leu Val Leu Glu Ile Ala Trp Glu Ala Leu Glu | |
| 1650 1655 1660 | |
| cgg gcc gga atc gat ccg ttg tcc ttg aag ggc agt ggg gtc ggc acg | 5040 |
| Arg Ala Gly Ile Asp Pro Leu Ser Leu Lys Gly Ser Gly Val Gly Thr | |
| 1665 1670 1675 1680 | |
| tac atc ggc gct gga agc cgt ggg tac gcg acg gat gtg cgg cag ttt | 5088 |
| Tyr Ile Gly Ala Gly Ser Arg Gly Tyr Ala Thr Asp Val Arg Gln Phe | |
| 1685 1690 1695 | |
| ccc gag gag gcg gag ggc tac ctg ctg acg ggt acc tcg gcc agt gtg | 5136 |
| Pro Glu Glu Ala Glu Gly Tyr Leu Leu Thr Gly Thr Ser Ala Ser Val | |
| 1700 1705 1710 | |
| ctg tcg ggt cgg gtc gcg tat tcg ttt ggt ttc gag ggt cct gcg gtg | 5184 |
| Leu Ser Gly Arg Val Ala Tyr Ser Phe Gly Phe Glu Gly Pro Ala Val | |
| 1715 1720 1725 | |
| acg gtg gat acg gct tgt tcg tcg tcg ttg gtg gcg ttg cat ctg gcg | 5232 |
| Thr Val Asp Thr Ala Cys Ser Ser Ser Leu Val Ala Leu His Leu Ala | |
| 1730 1735 1740 | |

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|---|------|
| tgc cag tcg ttg cgt tcg ggc gag tgt gat ctg gcg ttg gcc ggt ggt Cys Gln Ser Leu Arg Ser Gly Glu Cys Asp Leu Ala Leu Ala Gly Gly 1745 1750 1755 1760 | 5280 |
| gtg acc gtg atg tcg acg ccg gag atg ttc gtg gag ttc tcc cgt cag Val Thr Val Met Ser Thr Pro Glu Met Phe Val Glu Phe Ser Arg Gln 1765 1770 1775 | 5328 |
| cgc ggt ttg gcg ccg gat ggg cgg tgc aag tcg ttc gcg gag agc gcg Arg Gly Leu Ala Pro Asp Gly Arg Cys Lys Ser Phe Ala Glu Ser Ala 1780 1785 1790 | 5376 |
| gac ggc acc ggc tgg ggc gaa ggc gcg ggc ctg ttg ttg ctg gag cgg Asp Gly Thr Gly Trp Gly Glu Gly Ala Gly Leu Leu Leu Leu Glu Arg 1795 1800 1805 | 5424 |
| ttg tcg gac gcc cac cgg aat ggg cat cgg gtg ttg gcg gtg gtt cgt Leu Ser Asp Ala His Arg Asn Gly His Arg Val Leu Ala Val Val Arg 1810 1815 1820 | 5472 |
| ggg tca gcg gtg aat cag gac ggc gcc tcg aac gga ctg gcg gcg ccg Gly Ser Ala Val Asn Gln Asp Gly Ala Ser Asn Gly Leu Ala Ala Pro 1825 1830 1835 1840 | 5520 |
| aac ggt ccg tcg cag cag cgg gtg atc aac cag gca ctc gcg aat gcg Asn Gly Pro Ser Gln Gln Arg Val Ile Asn Gln Ala Leu Ala Asn Ala 1845 1850 1855 | 5568 |
| gct ctt tcg gcg tcc gat gtg gat gcg gtg gag gca cat ggc acc ggg Ala Leu Ser Ala Ser Asp Val Asp Ala Val Glu Ala His Gly Thr Gly 1860 1865 1870 | 5616 |
| acc agg ctg ggt gat ccg atc gag gcg cag gca ttg atc gca acg tat Thr Arg Leu Gly Asp Pro Ile Glu Ala Gln Ala Leu Ile Ala Thr Tyr 1875 1880 1885 | 5664 |
| ggg cag gcc ccg gag cgg gat cgg ccc ttg tgg ctg ggg tcg gtc aag Gly Gln Ala Arg Glu Arg Asp Arg Pro Leu Trp Leu Gly Ser Val Lys 1890 1895 1900 | 5712 |
| tcg aac atc ggt cat acg cag gcc gcg gcg ggt gtt gcc ggt gtg atc Ser Asn Ile Gly His Thr Gln Ala Ala Ala Gly Val Ala Gly Val Ile 1905 1910 1915 1920 | 5760 |
| aag atg gtg atg gcc atg cgg cac ggg cag ctg ccc gcc tcg ctg cac Lys Met Val Met Ala Met Arg His Gly Gln Leu Pro Ala Ser Leu His 1925 1930 1935 | 5808 |
| gcg gat gag ccc acg tcg gag gtc gat tgg tcg tcg ggg gcg gtc cgg Ala Asp Glu Pro Thr Ser Glu Val Asp Trp Ser Ser Gly Ala Val Arg 1940 1945 1950 | 5856 |
| ctc ctc gcc gaa cag gta cct tgg ccg gag tct gac cgt gtt cgt cgg Leu Leu Ala Glu Gln Val Pro Trp Pro Glu Ser Asp Arg Val Arg Arg 1955 1960 1965 | 5904 |
| gtg ggg gtt tcg tcg ttc ggg atc agc ggc acc aac gca cat gtg atc Val Gly Val Ser Ser Phe Gly Ile Ser Gly Thr Asn Ala His Val Ile 1970 1975 1980 | 5952 |
| ctc gaa caa gct acg aat gcg cca gat agt aca gcg gag acg gac aaa Leu Glu Gln Ala Thr Asn Ala Pro Asp Ser Thr Ala Glu Thr Asp Lys 1985 1990 1995 | 6000 |

| 1985 | LeA33955-US | | | | | | | | | | | | | | | 2000 | |
|---|-------------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|------|--|
| | 1995 | | | | | | | | | | | | | | | | |
| aca gaa tcc gga tct act gtc gat att ccg gtc gtt ccc tgg ttg gtg | | | | | | | | | | | | | | | | 6048 | |
| Thr Glu Ser Gly Ser Thr Val Asp Ile Pro Val Val Pro Trp Leu Val | | | | | | | | | | | | | | | | | |
| | 2005 | | | | | | | | | | | | | | | | |
| tcg gga aag acg acg gat tcc ctg cgg gga caa gcc gaa cga gtc ttg | | | | | | | | | | | | | | | | 6096 | |
| Ser Gly Lys Thr Thr Asp Ser Leu Arg Gly Gln Ala Glu Arg Val Leu | | | | | | | | | | | | | | | | | |
| | 2020 | | | | | | | | | | | | | | | | |
| tct cag gtc gag tcc cgg ccg gag cag cgt tcg ctg gat gtt gcc tac | | | | | | | | | | | | | | | | 6144 | |
| Ser Gln Val Glu Ser Arg Pro Glu Gln Arg Ser Leu Asp Val Ala Tyr | | | | | | | | | | | | | | | | | |
| | 2035 | | | | | | | | | | | | | | | | |
| tcg ctt gct tct ggc cga gcc gcg ctg gat gaa cgc gct gtc gtg ctg | | | | | | | | | | | | | | | | 6192 | |
| Ser Leu Ala Ser Gly Arg Ala Ala Leu Asp Glu Arg Ala Val Val Leu | | | | | | | | | | | | | | | | | |
| | 2050 | | | | | | | | | | | | | | | | |
| ggg ggc gac cgc ggt gag ctg gtt gct gga ctg gcg gcg ttg gcc gcc | | | | | | | | | | | | | | | | 6240 | |
| Gly Ala Asp Arg Gly Glu Leu Val Ala Gly Leu Ala Ala Leu Ala Ala | | | | | | | | | | | | | | | | | |
| | 2065 | | | | | | | | | | | | | | | | |
| ggg cag gag gct tct ggg gtg atc agc gga act cgt gct tct gct cgg | | | | | | | | | | | | | | | | 6288 | |
| Gly Gln Glu Ala Ser Gly Val Ile Ser Gly Thr Arg Ala Ser Ala Arg | | | | | | | | | | | | | | | | | |
| | 2085 | | | | | | | | | | | | | | | | |
| ttc ggg ttc gtg ttc tcg ggg cag ggt ggt cag tgg ttg ggg atg ggc | | | | | | | | | | | | | | | | 6336 | |
| Phe Gly Phe Val Phe Ser Gly Gln Gly Gly Gln Trp Leu Gly Met Gly | | | | | | | | | | | | | | | | | |
| | 2100 | | | | | | | | | | | | | | | | |
| aga gcg ctc tac tcg aag ttt ccg gtg ttc gct gct gcg ttt gat gag | | | | | | | | | | | | | | | | 6384 | |
| Arg Ala Leu Tyr Ser Lys Phe Pro Val Phe Ala Ala Ala Phe Asp Glu | | | | | | | | | | | | | | | | | |
| | 2115 | | | | | | | | | | | | | | | | |
| gct tgc gcc gag ttg gag gca cat ctg ggg gaa gac cgc cgg gtt cgg | | | | | | | | | | | | | | | | 6432 | |
| Ala Cys Ala Glu Leu Glu Ala His Leu Gly Glu Asp Arg Arg Val Arg | | | | | | | | | | | | | | | | | |
| | 2130 | | | | | | | | | | | | | | | | |
| gat gtg gtc ttc ggt tcc gat gcg cag ctg ctg gat cag acg ctg tgg | | | | | | | | | | | | | | | | 6480 | |
| Asp Val Val Phe Gly Ser Asp Ala Gln Leu Leu Asp Gln Thr Leu Trp | | | | | | | | | | | | | | | | | |
| | 2145 | | | | | | | | | | | | | | | | |
| gcg cag tcg ggt ctg ttc gcg ctg caa gcc ggc ctc ttg ggg ctg ctg | | | | | | | | | | | | | | | | 6528 | |
| Ala Gln Ser Gly Leu Phe Ala Leu Gln Ala Gly Leu Leu Gly Leu Leu | | | | | | | | | | | | | | | | | |
| | 2165 | | | | | | | | | | | | | | | | |
| ggt tcg tgg ggc gtt cgg ccg gat gtg gtg atg ggg cat tcg gtc ggg | | | | | | | | | | | | | | | | 6576 | |
| Gly Ser Trp Gly Val Arg Pro Asp Val Val Met Gly His Val Gly | | | | | | | | | | | | | | | | | |
| | 2180 | | | | | | | | | | | | | | | | |
| gag ttg gcc gcc gcg ttt gcg gct ggc gtg ttg tcg ttg cgg gat gcg | | | | | | | | | | | | | | | | 6624 | |
| Glu Leu Ala Ala Ala Phe Ala Ala Gly Val Leu Ser Leu Arg Asp Ala | | | | | | | | | | | | | | | | | |
| | 2195 | | | | | | | | | | | | | | | | |
| gct cgg ttg gtg gcc gcg gcg gcc cgg ttg atg caa gcc ctg ccc tct | | | | | | | | | | | | | | | | 6672 | |
| Ala Arg Leu Val Ala Ala Arg Ala Arg Leu Met Gln Ala Leu Pro Ser | | | | | | | | | | | | | | | | | |
| | 2210 | | | | | | | | | | | | | | | | |
| gac ggc gcg atg ttg gcg gtg gct gct ggt gaa gac ctt gtt cgg cca | | | | | | | | | | | | | | | | 6720 | |
| Asp Gly Ala Met Leu Ala Val Ala Ala Gly Glu Asp Leu Val Arg Pro | | | | | | | | | | | | | | | | | |
| | 2225 | | | | | | | | | | | | | | | | |
| ttg ctg gcc ggt cgg gag gag tcc gtg agc gtc gcc gcg ctc aat gcc | | | | | | | | | | | | | | | | 6768 | |

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|-----|-----|-----|------|------|------|------|------|------|------|------|------|------|------|------|------|------|--|
| Leu | Leu | Ala | Gly | Arg | Glu | Glu | Ser | Val | Ser | Val | Ala | Ala | Leu | Asn | Ala | | |
| | | | 2245 | | | | | | 2250 | | | | | 2255 | | | |
| ccc | ggt | tcg | gtg | gtg | ttg | tcg | ggc | gat | cgg | gag | gtg | ctg | gcc | agc | atc | 6816 | |
| Pro | Gly | Ser | Val | Val | Leu | Ser | Gly | Asp | Arg | Glu | Val | Leu | Ala | Ser | Ile | | |
| | | | 2260 | | | | | 2265 | | | | | 2270 | | | | |
| gtc | ggc | cgg | ctg | acc | gag | ctc | cga | gtc | cgg | acg | cgg | cgc | ttg | cgg | gtc | 6864 | |
| Val | Gly | Arg | Leu | Thr | Glu | Leu | Arg | Val | Arg | Thr | Arg | Arg | Leu | Arg | Val | | |
| | | | 2275 | | | | 2280 | | | | | 2285 | | | | | |
| tcc | cat | gct | ttt | cat | tcg | cac | cgg | atg | gac | ccg | atg | ttg | ggc | gag | ttc | 6912 | |
| Ser | His | Ala | Phe | His | Ser | His | Arg | Met | Asp | Pro | Met | Leu | Gly | Glu | Phe | | |
| | | | 2290 | | | | 2295 | | | | 2300 | | | | | | |
| gcc | cag | atc | gcc | gag | tct | gcg | gag | ttc | ggt | aag | cca | acg | aca | ccg | ctt | 6960 | |
| Ala | Gln | Ile | Ala | Glu | Ser | Ala | Glu | Phe | Gly | Lys | Pro | Thr | Thr | Pro | Leu | | |
| | | | 2305 | | | 2310 | | | | 2315 | | | | | 2320 | | |
| gtg | tcg | acg | ttg | acg | ggt | gag | ctc | gac | aga | gcc | gcg | gaa | atg | agc | aca | 7008 | |
| Val | Ser | Thr | Leu | Thr | Gly | Glu | Leu | Asp | Arg | Ala | Ala | Glu | Met | Ser | Thr | | |
| | | | | 2325 | | | | | 2330 | | | | | 2335 | | | |
| cca | ggg | tat | tgg | gtg | cgc | cag | gcg | cgt | gaa | ccc | gtc | cgt | ttc | gcc | gac | 7056 | |
| Pro | Gly | Tyr | Trp | Val | Arg | Gln | Ala | Arg | Glu | Pro | Val | Arg | Phe | Ala | Asp | | |
| | | | 2340 | | | | | 2345 | | | | | 2350 | | | | |
| ggt | gtc | cag | gcc | ctg | gca | gcg | cag | ggc | ata | ggc | acg | gtc | gtc | gag | ctc | 7104 | |
| Gly | Val | Gln | Ala | Leu | Ala | Ala | Gln | Gly | Ile | Gly | Thr | Val | Val | Glu | Leu | | |
| | | | 2355 | | | | 2360 | | | | | 2365 | | | | | |
| ggc | ccg | gac | gga | acg | ctg | gcg | gca | ctg | gtt | cgg | gag | tgt | gcg | acc | gag | 7152 | |
| Gly | Pro | Asp | Gly | Thr | Leu | Ala | Ala | Leu | Val | Arg | Glu | Cys | Ala | Thr | Glu | | |
| | | | 2370 | | | | 2375 | | | | 2380 | | | | | | |
| tcc | gat | cgg | gtt | ggg | cgg | att | tcg | tcg | atc | cca | ctg | atg | cgc | agg | gag | 7200 | |
| Ser | Asp | Arg | Val | Gly | Arg | Ile | Ser | Ser | Ile | Pro | Leu | Met | Arg | Arg | Glu | | |
| | | | | 2385 | | 2390 | | | | 2395 | | | | | 2400 | | |
| cgg | gac | gag | acc | cgt | tcg | gtg | atg | aca | gcc | ctg | gcg | cat | ctc | cac | acc | 7248 | |
| Arg | Asp | Glu | Thr | Arg | Ser | Val | Met | Thr | Ala | Leu | Ala | His | Leu | His | Thr | | |
| | | | | 2405 | | | | | 2410 | | | | | 2415 | | | |
| cgt | ggt | ggt | gag | gtg | gac | tgg | cag | gcg | ttt | ttc | gcc | ggt | acc | ggc | gct | 7296 | |
| Arg | Gly | Gly | Glu | Val | Asp | Trp | Gln | Ala | Phe | Phe | Ala | Gly | Thr | Gly | Ala | | |
| | | | 2420 | | | | | 2425 | | | | | 2430 | | | | |
| agg | cag | ctc | gag | ttg | cca | acg | tat | gcc | ttc | caa | cga | cag | cac | tac | tgg | 7344 | |
| Arg | Gln | Leu | Glu | Leu | Pro | Thr | Tyr | Ala | Phe | Gln | Arg | Gln | His | Tyr | Trp | | |
| | | | 2435 | | | | 2440 | | | | | 2445 | | | | | |
| atc | gag | tcc | agt | gcg | cgg | cca | gca | gcg | gac | cgc | gca | gac | atc | ggc | gag | 7392 | |
| Ile | Glu | Ser | Ser | Ala | Arg | Pro | Ala | Arg | Asp | Arg | Ala | Asp | Ile | Gly | Glu | | |
| | | | | 2450 | | | 2455 | | | | 2460 | | | | | | |
| gtg | gcg | gaa | cag | ttc | tgg | acc | gcg | gtt | gac | caa | ggc | gat | ctg | gca | acg | 7440 | |
| Val | Ala | Glu | Gln | Phe | Trp | Thr | Ala | Val | Asp | Gln | Gly | Asp | Leu | Ala | Thr | | |
| | | | | | 2470 | | | | 2475 | | | | | 2480 | | | |
| ttg | gtc | gcc | gct | ctg | gat | ctt | ggg | gcg | gac | gac | gac | aca | tgc | gca | tcg | 7488 | |
| Leu | Val | Ala | Ala | Leu | Asp | Leu | Gly | Ala | Asp | Asp | Asp | Thr | Cys | Ala | Ser | | |
| | | | | 2485 | | | | | 2490 | | | | | 2495 | | | |

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| | |
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| ttg agc gat gta ttg ccg gcg ttg tcc tcc tgg cga agc gga ctc cgc | 7536 |
| Leu Ser Asp Val Leu Pro Ala Leu Ser Ser Trp Arg Ser Gly Leu Arg | |
| 2500 2505 2510 | |
| aac cgt tcg ctc gtc gat tcc tgc cgg tac cga atc agt tgg cat tcc | 7584 |
| Asn Arg Ser Leu Val Asp Ser Cys Arg Tyr Arg Ile Ser Trp His Ser | |
| 2515 2520 2525 | |
| tct cgg gag gtg ccg gcc ccg aag att tcc ggt acc tgg ctg ttg gtc | 7632 |
| Ser Arg Glu Val Pro Ala Pro Lys Ile Ser Gly Thr Trp Leu Leu Val | |
| 2530 2535 2540 | |
| gtg ccc ggt gct gcg gat gac gga ttg gtc acg gct ttg acg agt tca | 7680 |
| Val Pro Gly Ala Ala Asp Asp Gly Leu Val Thr Ala Leu Thr Ser Ser | |
| 2545 2550 2555 2560 | |
| ctg gtc gga ggc ggc gcc gag gtc gtc cgg atc ggc ctg tcc gaa gag | 7728 |
| Leu Val Gly Gly Gly Ala Glu Val Val Arg Ile Gly Leu Ser Glu Glu | |
| 2565 2570 2575 | |
| gac ccg cac cgc gag gac gtc gca cag cgg ctg gcc aat gcg ctg acg | 7776 |
| Asp Pro His Arg Glu Asp Val Ala Gln Arg Leu Ala Asn Ala Leu Thr | |
| 2580 2585 2590 | |
| gat gcc ggt caa ctc ggt ggc gtg ctt tcg ctg ttg ggg ctc gat gaa | 7824 |
| Asp Ala Gly Gln Leu Gly Gly Val Leu Ser Leu Leu Gly Leu Asp Glu | |
| 2595 2600 2605 | |
| tcg cct gct ccg gga ttc tcc tgc ttg cca act ggt ttc gcg ctg act | 7872 |
| Ser Pro Ala Pro Gly Phe Ser Cys Leu Pro Thr Gly Phe Ala Leu Thr | |
| 2610 2615 2620 | |
| gtg cag ctt ctg cgg gcc ttg cgg aag gcc gac gtc gag gcg cct ttt | 7920 |
| Val Gln Leu Leu Arg Ala Leu Arg Lys Ala Asp Val Glu Ala Pro Phe | |
| 2625 2630 2635 2640 | |
| tgg gcg gtg acg cgc ggc ggc gtc gcg ttg gaa gat gta cgc gtg tct | 7968 |
| Trp Ala Val Thr Arg Gly Gly Val Ala Leu Glu Asp Val Arg Val Ser | |
| 2645 2650 2655 | |
| ccg gag cag gcc ctg gtc tgg ggg ctg ctg cgt gtc gcg gga ctg gag | 8016 |
| Pro Glu Gln Ala Leu Val Trp Gly Leu Leu Arg Val Ala Gly Leu Glu | |
| 2660 2665 2670 | |
| cac ccg gag ttc tgg ggt ggc ttg atc gac ctg cca tcg gac tgg gac | 8064 |
| His Pro Glu Phe Trp Gly Gly Leu Ile Asp Leu Pro Ser Asp Trp Asp | |
| 2675 2680 2685 | |
| gac cga ttg ggt gcc ccg ttg gcg ggt gtg ttg gcg gat ggt ggc gag | 8112 |
| Asp Arg Leu Gly Ala Arg Leu Ala Gly Val Leu Ala Asp Gly Gly Glu | |
| 2690 2695 2700 | |
| gat caa gtc gcc att cgc cgt ggt ggt gtg ttc gtg cgg cgg ttg gaa | 8160 |
| Asp Gln Val Ala Ile Arg Arg Gly Gly Val Phe Val Arg Arg Leu Glu | |
| 2705 2710 2715 2720 | |
| cgc gct ggt gcg tcg ggt gcc ggg tcg gtg tgg cgt cct cgg ggg acg | 8208 |
| Arg Ala Gly Ala Ser Gly Ala Gly Ser Val Trp Arg Pro Arg Gly Thr | |
| 2725 2730 2735 | |
| gtg ttg gtg acg ggt ggt acg ggc ggt ttg ggg gcg cat gtt gcc cgg | 8256 |
| Val Leu Val Thr Gly Gly Thr Gly Gly Leu Gly Ala His Val Ala Arg | |
| 2740 2745 2750 | |

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| | |
|---|------|
| tgg ttg gcc ggt gcc ggg gct gag cac gtg gtg ttg acc agc cgt cga Trp Leu Ala Gly Ala Gly Ala Glu His Val Val Leu Thr Ser Arg Arg 2755 2760 2765 | 8304 |
| gga gcg gac gct ccg ggc gct ggg gaa ttg cgg gcg gag ctg gag gcg Gly Ala Asp Ala Pro Gly Ala Gly Glu Leu Arg Ala Glu Leu Glu Ala 2770 2775 2780 | 8352 |
| ctg ggt gct cgg gtg tcg att gtg ccc tgc gac gtg gct gat cgt gac Leu Gly Ala Arg Val Ser Ile Val Pro Cys Asp Val Ala Asp Arg Asp 2785 2790 2795 2800 | 8400 |
| gca gtg gct gga gtg ttg gca ggg atc ggt ggg gag tgt ccg ctg act Ala Val Ala Gly Val Leu Ala Gly Ile Gly Gly Glu Cys Pro Leu Thr 2805 2810 2815 | 8448 |
| gcg gtg gta cac gcc gcc ggg gtc ggc gag gcg ggc gac gta gtg gag Ala Val Val His Ala Ala Gly Val Gly Glu Ala Gly Asp Val Val Glu 2820 2825 2830 | 8496 |
| atg ggt ttg gcg gat ttt gca gcg gtg ttg tcg gcg aag gtg cgt ggt Met Gly Leu Ala Asp Phe Ala Ala Val Leu Ser Ala Lys Val Arg Gly 2835 2840 2845 | 8544 |
| gcg gcg aat ctg gac gag ttg ctg gcc gac tcg gag ctg gat gcg ttt Ala Ala Asn Leu Asp Glu Leu Leu Ala Asp Ser Glu Leu Asp Ala Phe 2850 2855 2860 | 8592 |
| gtg atg ttc tcc tcg gtg tcg ggg gtg tgg gga gcc ggc gga cag ggt Val Met Phe Ser Ser Val Ser Gly Val Trp Gly Ala Gly Gly Gln Gly 2865 2870 2875 2880 | 8640 |
| gcg tat gcg gct gcg aac gcc tac ttg gat gcg ttg gcc gag cag cgt Ala Tyr Ala Ala Ala Asn Ala Tyr Leu Asp Ala Leu Ala Glu Gln Arg 2885 2890 2895 | 8688 |
| cgg gcg agg gga ttg gtc ggg acc gcg gtt gcg tgg gga ccg tgg gcc Arg Ala Arg Gly Leu Val Gly Thr Ala Val Ala Trp Gly Pro Trp Ala 2900 2905 2910 | 8736 |
| ggt gac ggc atg gcc gcc ggc gaa acc ggc gca cag ctg cac cgg atg Gly Asp Gly Met Ala Ala Gly Glu Thr Gly Ala Gln Leu His Arg Met 2915 2920 2925 | 8784 |
| ggc ctg gcg tcg atg gaa ccg agc gcg gcg ctg ctg gca ctt cag ggt Gly Leu Ala Ser Met Glu Pro Ser Ala Ala Leu Leu Ala Leu Gln Gly 2930 2935 2940 | 8832 |
| gca ttg gac cgc gat gag acc tcc ctc gtc gtg gcc gat gtc gat tgg Ala Leu Asp Arg Asp Glu Thr Ser Leu Val Val Ala Asp Val Asp Trp 2945 2950 2955 2960 | 8880 |
| gca cgg ttc gcc cca gcc ttc acc tcg gca cgt cga cgc ccg ctg ctg Ala Arg Phe Ala Pro Ala Phe Thr Ser Ala Arg Arg Arg Pro Leu Leu 2965 2970 2975 | 8928 |
| gac acc atc gac gag gcc cga gcc gca ttg gaa acc acc ggc gaa caa Asp Thr Ile Asp Glu Ala Arg Ala Ala Leu Glu Thr Thr Gly Glu Gln 2980 2985 2990 | 8976 |
| gcg ggc aca ggc aaa ccc gtt gag ctg acg caa cgc ctg gcc gga ctg Ala Gly Thr Gly Lys Pro Val Glu Leu Thr Gln Arg Leu Ala Gly Leu 2995 3000 | 9024 |

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| 2995 | 3000 | 3005 | |
|---|------|------|------|
| tcg cgg aag gaa cgc gac gat gcg gta ttg gat ctg gtg cgg gcg gag Ser Arg Lys Glu Arg Asp Asp Ala Val Leu Asp Leu Val Arg Ala Glu 3010 3015 3020 | | | 9072 |
| acg gcg gct gtg ctg gga cgc gac gat gcc acg gcc ctg gcg cca tcg Thr Ala Ala Val Leu Gly Arg Asp Asp Ala Thr Ala Leu Ala Pro Ser 3025 3030 3035 3040 | | | 9120 |
| cgg ccg ttc cag gaa ctc gga ttc gac tcc ttg atg gcg gtg gag ctg Arg Pro Phe Gln Glu Leu Gly Phe Asp Ser Leu Met Ala Val Glu Leu 3045 3050 3055 | | | 9168 |
| cgc aac cgg ctg aac acc gcc acc ggg atc cag ctg ccc gcc agc acg Arg Asn Arg Leu Asn Thr Ala Thr Gly Ile Gln Leu Pro Ala Ser Thr 3060 3065 3070 | | | 9216 |
| att ttc gac tac ccc aat gcc gag tcg ctg tcg cgt cac ctc tgc gcc Ile Phe Asp Tyr Pro Asn Ala Glu Ser Leu Ser Arg His Leu Cys Ala 3075 3080 3085 | | | 9264 |
| gag ctt ttc cca acg gag act acc gtg gac tcg gcc ctt gcc gag ctc Glu Leu Phe Pro Thr Glu Thr Thr Val Asp Ser Ala Leu Ala Glu Leu 3090 3095 3100 | | | 9312 |
| gat cga atc gag cag cag ctc tcg atg ctc acc gcc gaa gcg cgg gca Asp Arg Ile Glu Gln Gln Leu Ser Met Leu Thr Gly Glu Ala Arg Ala 3105 3110 3115 3120 | | | 9360 |
| cgg gac cga atc gcg aca cga ctg cga gcc ctc cac gag aag tgg aac Arg Asp Arg Ile Ala Thr Arg Leu Arg Ala Leu His Glu Lys Trp Asn 3125 3130 3135 | | | 9408 |
| agc gca gct gaa gta ccg acc gga gcc gat gtc ctg agc acg ctc gat Ser Ala Ala Glu Val Pro Thr Gly Ala Asp Val Leu Ser Thr Leu Asp 3140 3145 3150 | | | 9456 |
| tcg gcg acg cac gac gag ata ttc gag ttc atc gac aac gag ctc gac Ser Ala Thr His Asp Glu Ile Phe Glu Phe Ile Asp Asn Glu Leu Asp 3155 3160 3165 | | | 9504 |
| ctg tcc tga Leu Ser 3170 | | | 9513 |

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<211> 3170

<212> PRT

<213> Saccharopolyspora spinosa

<400> 46

Met Ser Asn Glu Glu Lys Leu Arg Glu Tyr Leu Arg Arg Ala Leu Val
1 5 10 15

Asp Leu His Gln Ala Arg Glu Arg Leu His Glu Ala Glu Ser Gly Glu
20 25 30

Arg Glu Pro Ile Ala Ile Val Ala Met Gly Cys Arg Tyr Pro Gly Gly
35 40 45

Val Gln Asp Pro Glu Gly Leu Trp Lys Leu Val Ala Ser Gly Gly Asp

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60

50 Ala Ile Gly Glu Phe Pro Ala Asp Arg Gly Trp His Leu Asp Glu Leu
 65 70 75 80
 Tyr Asp Pro Asp Pro Asp Gln Pro Gly Thr Cys Tyr Thr Arg His Gly
 85 90 95
 Gly Phe Leu His Asp Ala Gly Glu Phe Asp Ala Gly Phe Phe Asp Ile
 100 105 110
 Ser Pro Arg Glu Ala Leu Ala Met Asp Pro Gln Gln Arg Leu Leu Leu
 115 120 125
 Glu Ile Ser Trp Glu Thr Val Glu Ser Ala Gly Met Asp Pro Arg Ser
 130 135 140
 Leu Arg Gly Ser Arg Thr Gly Val Phe Ala Gly Leu Met Tyr Glu Gly
 145 150 155 160
 Tyr Asp Thr Gly Ala His Arg Ala Gly Glu Gly Val Glu Gly Tyr Leu
 165 170 175
 Gly Thr Gly Asn Ala Gly Ser Val Ala Ser Gly Arg Val Ala Tyr Ala
 180 185 190
 Phe Gly Phe Glu Gly Pro Ala Val Thr Val Asp Thr Ala Cys Ser Ser
 195 200 205
 Ser Leu Val Ala Leu His Leu Ala Cys Gln Ser Leu Arg Gln Gly Glu
 210 215 220
 Cys Asp Leu Ala Leu Ala Gly Gly Val Thr Val Met Ser Thr Pro Glu
 225 230 235 240
 Arg Phe Val Glu Phe Ser Arg Gln Arg Gly Leu Ala Pro Asp Gly Arg
 245 250 255
 Cys Lys Ser Phe Ala Ala Ala Ala Asp Gly Thr Gly Trp Gly Glu Gly
 260 265 270
 Ala Gly Leu Val Leu Leu Glu Arg Leu Ser Asp Ala Arg Arg Asn Gly
 275 280 285
 His Arg Val Leu Ala Val Val Arg Gly Ser Ala Val Asn Gln Asp Gly
 290 295 300
 Ala Ser Asn Gly Leu Thr Ala Pro Asn Gly Leu Ala Gln Glu Arg Val
 305 310 315 320
 Ile Gln Gln Val Leu Thr Ser Ala Gly Leu Ser Ala Ser Asp Val Asp
 325 330 335
 Ala Val Glu Ala His Gly Thr Gly Thr Arg Leu Gly Asp Pro Ile Glu
 340 345 350
 Ala Gln Ala Leu Ile Ala Ala Tyr Gly Gln Asp Arg Asp Arg Asp Arg
 355 360 365
 Pro Leu Trp Leu Gly Ser Val Lys Ser Asn Ile Gly His Thr Gln Ala
 370 375 380
 Ala Ala Gly Val Ala Gly Val Ile Lys Met Val Met Ala Met Arg His

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| 385 | 390 | 395 | 400 |
|---|-----|-----|-----|
| Gly Glu Leu Pro Arg Thr Leu His Val Asp Glu Pro Asn Ser His Val | 405 | 410 | 415 |
| Asp Trp Ser Ala Gly Ala Val Arg Leu Leu Thr Glu Asn Ile Arg Trp | 420 | 425 | 430 |
| Pro Gly Thr Gly Thr Arg Arg Ala Gly Val Ser Ser Phe Gly Val Ser | 435 | 440 | 445 |
| Gly Thr Asn Ala His Val Ile Leu Glu His Asp Pro Leu Ala Val Thr | 450 | 455 | 460 |
| Glu Asn Glu Glu Ala Ala Gln Ser Pro Ala Pro Gly Ile Val Pro Trp | 465 | 470 | 475 |
| Ala Leu Ser Gly Arg Ser Ser Thr Ala Leu Arg Ala Gln Ala Glu Arg | 485 | 490 | 495 |
| Leu Arg Glu Leu Cys Glu Gln Thr Asp Pro Asp Pro Val Asp Val Gly | 500 | 505 | 510 |
| Phe Ser Leu Ala Ala Thr Arg Thr Ala Trp Glu His Arg Ala Val Val | 515 | 520 | 525 |
| Leu Gly Arg Asp Ser Ala Thr Leu Arg Ser Gly Leu Gly Val Val Ala | 530 | 535 | 540 |
| Ser Gly Glu Pro Ala Val Asp Val Val Glu Gly Ser Val Leu Asp Gly | 545 | 550 | 555 |
| Glu Val Val Phe Val Phe Pro Gly Gln Gly Trp Gln Trp Ala Gly Met | 565 | 570 | 575 |
| Ala Val Asp Leu Leu Asp Ala Ser Pro Thr Phe Ala Arg His Met Asp | 580 | 585 | 590 |
| Glu Cys Ala Thr Ala Leu Arg Arg Tyr Val Asp Trp Ser Leu Val Asp | 595 | 600 | 605 |
| Val Leu Arg Gly Ala Glu Asn Ser Pro Pro Leu Asp Arg Val Asp Val | 610 | 615 | 620 |
| Leu Gln Pro Ala Ser Phe Ala Val Met Val Ser Leu Ala Glu Val Trp | 625 | 630 | 635 |
| Arg Ser Tyr Gly Val Arg Pro Ala Ala Val Val Gly His Ser Gln Gly | 645 | 650 | 655 |
| Glu Ile Ala Ala Ala Cys Ala Ala Gly Val Leu Pro Leu Glu Asp Ala | 660 | 665 | 670 |
| Ala Arg Leu Val Ala Leu Arg Ser Arg Ala Leu Lys Gly Leu Ser Gly | 675 | 680 | 685 |
| Arg Gly Gly Met Ala Ser Leu Ala Cys Pro Ala Asp Glu Val Ala Ala | 690 | 695 | 700 |
| Leu Phe Ala Gly Ser Gly Gly Arg Leu Glu Val Ala Ala Ile Asn Gly | 705 | 710 | 715 |
| Pro Arg Ser Val Val Val Ser Gly Asp Leu Glu Ala Val Asp Glu Leu | | | |

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730

725

735

Leu Ala Glu Cys Ala Glu Lys Asp Met Arg Ala Arg Arg Ile Pro Val
740 745 750
Asp Tyr Ala Ser His Ser Ala His Val Glu Val Val Arg Ser Pro Val
755 760 765
Leu Ala Ala Ala Ala Gly Val Arg His Arg Asp Gly Gln Val Pro Trp
770 775 780
Trp Ser Thr Val Ile Gly Asp Trp Val Asp Pro Ala Arg Leu Asp Gly
785 790 795 800
Glu Tyr Trp Tyr Arg Asn Leu Arg Gln Pro Val Arg Phe Glu His Ala
805 810 815
Val Gln Gly Leu Val Glu Arg Gly Phe Gly Leu Phe Ile Glu Met Ser
820 825 830
Ala His Pro Val Leu Thr Thr Ala Val Glu Glu Thr Gly Ala Glu Ser
835 840 845
Glu Thr Ala Val Ala Ala Val Gly Thr Leu Arg Arg Asp Ser Gly Gly
850 855 860
Leu Arg Arg Leu Leu His Ser Leu Ala Glu Ala Tyr Val Arg Gly Ala
865 870 875 880
Thr Val Asp Trp Ala Val Ala Phe Gly Gly Ala Gly Arg Arg Leu Asp
885 890 895
Leu Pro Thr Tyr Pro Phe Gln Arg Gln Arg Tyr Trp Leu Asp Lys Gly
900 905 910
Ala Ala Ser Asp Glu Ala Arg Ala Val Ser Asp Pro Ala Ala Gly Trp
915 920 925
Phe Trp Gln Ala Val Ala Arg Gln Asp Leu Lys Ser Val Ser Asp Ala
930 935 940
Leu Asp Leu Asp Ala Asp Ala Pro Leu Ser Ala Thr Leu Pro Ala Leu
945 950 955 960
Ser Val Trp His Arg Gln Glu Arg Glu Arg Val Leu Ala Asp Gly Trp
965 970 975
Arg Tyr Arg Val Asp Trp Val Arg Val Ala Pro Gln Pro Val Arg Arg
980 985 990
Thr Arg Glu Thr Trp Leu Leu Val Val Pro Pro Gly Gly Ile Glu Glu
995 1000 1005
Ala Leu Val Glu Arg Leu Thr Asp Ala Leu Asn Thr Arg Gly Ile Ser
1010 1015 1020
Thr Leu Arg Leu Asp Val Pro Pro Ala Ala Thr Ser Gly Glu Leu Ala
1025 1030 1035 1040
Thr Glu Leu Arg Ala Ala Ala Asp Gly Asp Pro Val Lys Ala Ile Leu
1045 1050 1055
Ser Leu Thr Ala Leu Asp Glu Arg Pro His Pro Glu Cys Lys Asp Val

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 Pro Ser Gly Ile Ala Leu Leu Leu Asn Leu Val Lys Ala Leu Gly Glu
 1075 1080 1085
 Ala Asp Leu Arg Ile Pro Leu Trp Thr Ile Thr Arg Gly Ala Val Lys
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 Ala Gly Pro Ala Asp Arg Leu Leu Arg Pro Met Gln Ala Gln Ala Trp
 1105 1110 1115 1120
 Gly Leu Gly Arg Val Ala Ala Leu Glu His Pro Glu Arg Trp Gly Gly
 1125 1130 1135
 Leu Ile Asp Leu Pro Asp Ser Leu Asp Gly Asp Val Leu Thr Arg Leu
 1140 1145 1150
 Gly Glu Ala Leu Thr Asn Gly Leu Ala Glu Asp Gln Leu Ala Ile Arg
 1155 1160 1165
 Gln Ser Gly Val Leu Ala Arg Arg Leu Val Pro Ala Pro Ala Asn Gln
 1170 1175 1180
 Pro Ala Gly Arg Lys Trp Arg Pro Arg Gly Ser Ala Leu Ile Thr Gly
 1185 1190 1195 1200
 Gly Leu Gly Ala Val Gly Ala Gln Val Ala Arg Trp Leu Ala Glu Ile
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 Gly Ala Glu Arg Ile Val Leu Thr Ser Arg Arg Gly Asn Gln Ala Ala
 1220 1225 1230
 Gly Ala Ala Glu Leu Glu Ala Glu Leu Arg Ala Leu Gly Ala Gln Val
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 Ser Ile Val Ala Cys Asp Val Thr Asp Arg Ala Glu Met Ser Ala Leu
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 Arg Leu Leu Pro Leu Ala Glu Thr Asp Gln Asn Gly Leu Ala Glu Ile
 1285 1290 1295
 Cys Ala Ala Lys Val Arg Gly Ala Gln Val Leu Asp Glu Leu Cys Asp
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 Trp Gly Gly Gly Gly Gln Gly Ala Tyr Gly Ala Ala Asn Ala Phe Leu
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 Ile Ser Trp Gly Ser Trp Ala Gly Gly Gly Met Ala Asp Gly Ala Ala
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1395 1400 1405
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 1460 1465 1470
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 1475 1480 1485
 Glu Val Gln Pro Glu Arg Ala Phe Arg Ala Leu Gly Phe Asp Ser Leu
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 1555 1560 1565
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 1570 1575 1580
 Arg Leu Val Ala Ala Gly Thr Glu Val Ile Gly Glu Phe Pro Ser Asp
 585 1590 1595 1600
 Arg Gly Trp Asp Ala Glu Gly Leu Tyr Asp Pro Asp Ala Ser Arg Pro
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 1620 1625 1630
 Phe Asp Ala Asp Leu Phe Gly Ile Ser Pro Arg Glu Ala Leu Ala Met
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 665 1670 1675 1680
 Tyr Ile Gly Ala Gly Ser Arg Gly Tyr Ala Thr Asp Val Arg Gln Phe
 1685 1690 1695
 Pro Glu Glu Ala Glu Gly Tyr Leu Leu Thr Gly Thr Ser Ala Ser Val
 1700 1705 1710
 Leu Ser Gly Arg Val Ala Tyr Ser Phe Gly Phe Glu Gly Pro Ala Val
 1715 1720 1725
 Thr Val Asp Thr Ala Cys Ser Ser Ser Leu Val Ala Leu His Leu Ala
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1730

1735

Cys Gln Ser Leu Arg Ser Gly Glu Cys Asp Leu Ala Leu Ala Gly Gly
745 1750 1755 1760

Val Thr Val Met Ser Thr Pro Glu Met Phe Val Glu Phe Ser Arg Gln
1765 1770 1775

Arg Gly Leu Ala Pro Asp Gly Arg Cys Lys Ser Phe Ala Glu Ser Ala
1780 1785 1790

Asp Gly Thr Gly Trp Gly Glu Gly Ala Gly Leu Leu Leu Leu Glu Arg
1795 1800 1805

Leu Ser Asp Ala His Arg Asn Gly His Arg Val Leu Ala Val Val Arg
1810 1815 1820

Gly Ser Ala Val Asn Gln Asp Gly Ala Ser Asn Gly Leu Ala Ala Pro
825 1830 1835 1840

Asn Gly Pro Ser Gln Gln Arg Val Ile Asn Gln Ala Leu Ala Asn Ala
1845 1850 1855

Ala Leu Ser Ala Ser Asp Val Asp Ala Val Glu Ala His Gly Thr Gly
1860 1865 1870

Thr Arg Leu Gly Asp Pro Ile Glu Ala Gln Ala Leu Ile Ala Thr Tyr
1875 1880 1885

Gly Gln Ala Arg Glu Arg Asp Arg Pro Leu Trp Leu Gly Ser Val Lys
1890 1895 1900

Ser Asn Ile Gly His Thr Gln Ala Ala Ala Gly Val Ala Gly Val Ile
905 1910 1915 1920

Lys Met Val Met Ala Met Arg His Gly Gln Leu Pro Ala Ser Leu His
1925 1930 1935

Ala Asp Glu Pro Thr Ser Glu Val Asp Trp Ser Ser Gly Ala Val Arg
1940 1945 1950

Leu Leu Ala Glu Gln Val Pro Trp Pro Glu Ser Asp Arg Val Arg Arg
1955 1960 1965

Val Gly Val Ser Ser Phe Gly Ile Ser Gly Thr Asn Ala His Val Ile
1970 1975 1980

Leu Glu Gln Ala Thr Asn Ala Pro Asp Ser Thr Ala Glu Thr Asp Lys
985 1990 1995 2000

Thr Glu Ser Gly Ser Thr Val Asp Ile Pro Val Val Pro Trp Leu Val
2005 2010 2015

Ser Gly Lys Thr Thr Asp Ser Leu Arg Gly Gln Ala Glu Arg Val Leu
2020 2025 2030

Ser Gln Val Glu Ser Arg Pro Glu Gln Arg Ser Leu Asp Val Ala Tyr
2035 2040 2045

Ser Leu Ala Ser Gly Arg Ala Ala Leu Asp Glu Arg Ala Val Val Leu
2050 2055 2060

Gly Ala Asp Arg Gly Glu Leu Val Ala Gly Leu Ala Ala Leu Ala Ala
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2075

065 2070 2080
Gly Gln Glu Ala Ser Gly Val Ile Ser Gly Thr Arg Ala Ser Ala Arg
2085 2090 2095
Phe Gly Phe Val Phe Ser Gly Gln Gly Gly Gln Trp Leu Gly Met Gly
2100 2105 2110
Arg Ala Leu Tyr Ser Lys Phe Pro Val Phe Ala Ala Ala Phe Asp Glu
2115 2120 2125
Ala Cys Ala Glu Leu Glu Ala His Leu Gly Glu Asp Arg Arg Val Arg
2130 2135 2140
Asp Val Val Phe Gly Ser Asp Ala Gln Leu Leu Asp Gln Thr Leu Trp
145 2150 2155 2160
Ala Gln Ser Gly Leu Phe Ala Leu Gln Ala Gly Leu Leu Gly Leu Leu
2165 2170 2175
Gly Ser Trp Gly Val Arg Pro Asp Val Val Met Gly His Ser Val Gly
2180 2185 2190
Glu Leu Ala Ala Ala Phe Ala Ala Gly Val Leu Ser Leu Arg Asp Ala
2195 2200 2205
Ala Arg Leu Val Ala Ala Arg Ala Arg Leu Met Gln Ala Leu Pro Ser
2210 2215 2220
Asp Gly Ala Met Leu Ala Val Ala Ala Gly Glu Asp Leu Val Arg Pro
2225 2230 2235 2240
Leu Leu Ala Gly Arg Glu Glu Ser Val Ser Val Ala Ala Leu Asn Ala
2245 2250 2255
Pro Gly Ser Val Val Leu Ser Gly Asp Arg Glu Val Leu Ala Ser Ile
2260 2265 2270
Val Gly Arg Leu Thr Glu Leu Arg Val Arg Thr Arg Arg Leu Arg Val
2275 2280 2285
Ser His Ala Phe His Ser His Arg Met Asp Pro Met Leu Gly Glu Phe
2290 2295 2300
Ala Gln Ile Ala Glu Ser Ala Glu Phe Gly Lys Pro Thr Thr Pro Leu
305 2310 2315 2320
Val Ser Thr Leu Thr Gly Glu Leu Asp Arg Ala Ala Glu Met Ser Thr
2325 2330 2335
Pro Gly Tyr Trp Val Arg Gln Ala Arg Glu Pro Val Arg Phe Ala Asp
2340 2345 2350
Gly Val Gln Ala Leu Ala Ala Gln Gly Ile Gly Thr Val Val Glu Leu
2355 2360 2365
Gly Pro Asp Gly Thr Leu Ala Ala Leu Val Arg Glu Cys Ala Thr Glu
2370 2375 2380
Ser Asp Arg Val Gly Arg Ile Ser Ser Ile Pro Leu Met Arg Arg Glu
385 2390 2395 2400
Arg Asp Glu Thr Arg Ser Val Met Thr Ala Leu Ala His Leu His Thr

2415

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2740 2745 2750
 Trp Leu Ala Gly Ala Gly Ala Glu His Val Val Leu Thr Ser Arg Arg
 2755 2760 2765
 Gly Ala Asp Ala Pro Gly Ala Gly Glu Leu Arg Ala Glu Leu Glu Ala
 2770 2775 2780
 Leu Gly Ala Arg Val Ser Ile Val Pro Cys Asp Val Ala Asp Arg Asp
 785 2790 2795 2800
 Ala Val Ala Gly Val Leu Ala Gly Ile Gly Gly Glu Cys Pro Leu Thr
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 Met Gly Leu Ala Asp Phe Ala Ala Val Leu Ser Ala Lys Val Arg Gly
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 Ala Arg Phe Ala Pro Ala Phe Thr Ser Ala Arg Arg Arg Pro Leu Leu
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 Asp Thr Ile Asp Glu Ala Arg Ala Ala Leu Glu Thr Thr Gly Glu Gln
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 2995 3000 3005
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 3010 3015 3020
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 3060 3065 3070
 Ile Phe Asp Tyr Pro Asn Ala Glu Ser Leu Ser Arg His Leu Cys Ala

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3075 3080 3085
 Glu Leu Phe Pro Thr Glu Thr Thr Val Asp Ser Ala Leu Ala Glu Leu
 3090 3095 3100
 Asp Arg Ile Glu Gln Gln Leu Ser Met Leu Thr Gly Glu Ala Arg Ala
 105 3110 3115 3120
 Arg Asp Arg Ile Ala Thr Arg Leu Arg Ala Leu His Glu Lys Trp Asn
 3125 3130 3135
 Ser Ala Ala Glu Val Pro Thr Gly Ala Asp Val Leu Ser Thr Leu Asp
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 Leu Ser
 3170

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 <222> (1)..(14772)
 <223> ORF21; polyketide synthase

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 Met Ala Asn Glu Glu Lys Leu Phe Gly Tyr Leu Lys Lys Val Thr Ala
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 gac ctg cat cag acc cgg cag cgc ctg ctc gcg gcc gag agc cgg agt 96
 Asp Leu His Gln Thr Arg Gln Arg Leu Leu Ala Ala Glu Ser Arg Ser
 20 25 30
 cag gag ccg atc gcg atc gtc tcg gcg agc tgc cga ctg ccc ggc ggc 144
 Gln Glu Pro Ile Ala Ile Val Ser Ala Ser Cys Arg Leu Pro Gly Gly
 35 40 45
 gtc gac tct ccc gaa gcg ctc tgg caa ctc gtg cgc act ggc acc gac 192
 Val Asp Ser Pro Glu Ala Leu Trp Gln Leu Val Arg Thr Gly Thr Asp
 50 55 60
 gcc atc tcg gag ttc ccc gcc gac cgg ggc tgg gat ctc ggc cgg ttg 240
 Ala Ile Ser Glu Phe Pro Ala Asp Arg Gly Trp Asp Leu Gly Arg Leu
 65 70 75 80
 tac gat ccc gac ccg aac cac cag gga acg tcg tac acg cgg gcc ggc 288
 Tyr Asp Pro Asp Pro Asn His Gln Gly Thr Ser Tyr Thr Arg Ala Gly
 85 90 95
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 Gly Phe Leu Ala Gly Ala Gly Asp Phe Asp Pro Ala Met Phe Gly Ile
 100 105 110
 tcg ccg cgt gag gcg ttg gcg atg gac ccg cag caa cgg ttg ttg ctg 384
 Ser Pro Arg Glu Ala Leu Ala Met Asp Pro Gln Gln Arg Leu Leu Leu

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| 115 | | | 120 | | | 125 | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|--|--|------|
| gag | ctg | tcc | tgg | gag | gcc | ctc | gaa | cgg | gcg | ggc | ata | gac | ccg | aca | tcc | | | 432 |
| Glu | Leu | Ser | Trp | Glu | Ala | Leu | Glu | Arg | Ala | Gly | Ile | Asp | Pro | Thr | Ser | | | |
| | 130 | | | | | 135 | | | | | 140 | | | | | | | |
| ctg | cgc | ggc | agc | aag | acc | ggg | gtc | ttc | ggg | ggg | gtc | acg | ccc | cag | gag | | | 480 |
| Leu | Arg | Gly | Ser | Lys | Thr | Gly | Val | Phe | Gly | Gly | Val | Thr | Pro | Gln | Glu | | | |
| 145 | | | | | 150 | | | | 155 | | | | | | 160 | | | |
| tac | ggg | ccg | tcc | ttg | cag | gag | atg | agc | cga | aac | gct | ggg | ggg | ttt | gga | | | 528 |
| Tyr | Gly | Pro | Ser | Leu | Gln | Glu | Met | Ser | Arg | Asn | Ala | Gly | Gly | Phe | Gly | | | |
| | | | | 165 | | | | | 170 | | | | | 175 | | | | |
| ctc | acc | ggg | cgg | atg | gtg | agt | gtg | gcg | tcg | ggg | cgg | gtt | gcg | tat | tcg | | | 576 |
| Leu | Thr | Gly | Arg | Met | Val | Ser | Val | Ala | Ser | Gly | Arg | Val | Ala | Tyr | Ser | | | |
| | | | 180 | | | | | 185 | | | | | 190 | | | | | |
| ttt | ggg | ttt | gag | ggg | cct | gcg | gtg | acg | gtg | gat | acg | gcg | tgt | tcg | tcg | | | 624 |
| Phe | Gly | Phe | Glu | Gly | Pro | Ala | Val | Thr | Val | Asp | Thr | Ala | Cys | Ser | Ser | | | |
| | | 195 | | | | | 200 | | | | | 205 | | | | | | |
| tcg | ttg | gtg | gcc | ctg | cat | ttg | gcg | tgt | cag | tcg | ttg | cgt | tcc | ggc | gaa | | | 672 |
| Ser | Leu | Val | Ala | Leu | His | Leu | Ala | Cys | Gln | Ser | Leu | Arg | Ser | Gly | Glu | | | |
| | 210 | | | | | 215 | | | | | 220 | | | | | | | |
| tgc | gat | ctc | gcg | ctg | gcc | ggc | ggg | gtg | acg | gtg | atg | gcg | aca | ccg | gcg | | | 720 |
| Cys | Asp | Leu | Ala | Leu | Ala | Gly | Gly | Val | Thr | Val | Met | Ala | Thr | Pro | Ala | | | |
| 225 | | | | | 230 | | | | | 235 | | | | | 240 | | | |
| acg | ttc | gtg | gag | ttc | tcc | cgt | cag | cgt | ggg | ttg | gct | ccg | gac | ggg | cgg | | | 768 |
| Thr | Phe | Val | Glu | Phe | Ser | Arg | Gln | Arg | Gly | Leu | Ala | Pro | Asp | Gly | Arg | | | |
| | | | | 245 | | | | | 250 | | | | | 255 | | | | |
| tgc | aag | tcg | ttc | gcg | gct | gcc | gcg | gat | ggc | acc | ggg | tcg | ggg | gag | ggg | | | 816 |
| Cys | Lys | Ser | Phe | Ala | Ala | Ala | Ala | Asp | Gly | Thr | Gly | Trp | Gly | Glu | Gly | | | |
| | | | 260 | | | | | 265 | | | | | 270 | | | | | |
| gcc | ggg | ctg | gtg | ttg | ctg | gag | cgg | ttg | tcg | gat | gcg | cgg | cgg | aat | ggg | | | 864 |
| Ala | Gly | Leu | Val | Leu | Leu | Glu | Arg | Leu | Ser | Asp | Ala | Arg | Arg | Asn | Gly | | | |
| | | 275 | | | | 280 | | | | | | 285 | | | | | | |
| cac | gag | gtt | ctg | gcg | gtg | gtg | cgg | ggg | agc | gcg | gtg | aac | cag | gac | ggc | | | 912 |
| His | Glu | Val | Leu | Ala | Val | Val | Arg | Gly | Ser | Ala | Val | Asn | Gln | Asp | Gly | | | |
| | 290 | | | | | 295 | | | | | 300 | | | | | | | |
| gcg | tcg | aat | ggg | ttg | act | gcg | ccg | aat | ggg | ccg | tcg | cag | cag | cgg | gtg | | | 960 |
| Ala | Ser | Asn | Gly | Leu | Thr | Ala | Pro | Asn | Gly | Pro | Ser | Gln | Gln | Arg | Val | | | |
| 305 | | | | | 310 | | | | | 315 | | | | | 320 | | | |
| atc | acc | cag | gcg | ttg | gcg | agt | gcg | ggg | ctg | tcg | gtt | tcc | gat | gtg | gat | | | 1008 |
| Ile | Thr | Gln | Ala | Leu | Ala | Ser | Ala | Gly | Leu | Ser | Val | Ser | Asp | Val | Asp | | | |
| | | | | 325 | | | | | 330 | | | | | 335 | | | | |
| gcg | gtc | gag | gca | cat | ggg | acc | ggg | acc | acg | ttg | ggg | gat | ccg | atc | gag | | | 1056 |
| Ala | Val | Glu | Ala | His | Gly | Thr | Gly | Thr | Thr | Leu | Gly | Asp | Pro | Ile | Glu | | | |
| | | | 340 | | | | 345 | | | | | | 350 | | | | | |
| gca | cag | gcc | ctg | atc | gcc | acg | tac | ggg | cag | ggc | cgg | gag | aag | gat | cgg | | | 1104 |
| Ala | Gln | Ala | Leu | Ile | Ala | Thr | Tyr | Gly | Gln | Gly | Arg | Glu | Lys | Asp | Arg | | | |
| | | 355 | | | | | 360 | | | | | 365 | | | | | | |
| ccg | ttg | tgg | ttg | ggg | tcg | gtc | aag | tcc | aac | atc | ggg | cac | acg | cag | gcg | | | 1152 |

| LeA33955-US | | | | | | | | | | | | | | | |
|-------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Pro | Leu | Trp | Leu | Gly | Ser | Val | Lys | Ser | Asn | Ile | Gly | His | Thr | Gln | Ala |
| 370 | | | | | | 375 | | | | | 380 | | | | |
| gcc | gct | ggc | gtt | gcc | ggc | gtc | atc | aag | atg | gtc | ttg | gcg | atg | cgg | cac |
| Ala | Ala | Gly | Val | Ala | Gly | Val | Ile | Lys | Met | Val | Leu | Ala | Met | Arg | His |
| 385 | | | | | 390 | | | | | 395 | | | | | 400 |
| ggg | cag | ctg | ccc | gcc | acg | ttg | cat | gtg | gat | gag | ccc | acg | tcg | gcg | gtg |
| Gly | Gln | Leu | Pro | Ala | Thr | Leu | His | Val | Asp | Glu | Pro | Thr | Ser | Ala | Val |
| | | | | 405 | | | | | 410 | | | | | 415 | |
| gac | tgg | tcg | gcg | ggt | tcg | gtc | cgg | ctt | ctc | acg | gag | aac | acg | ccc | tgg |
| Asp | Trp | Ser | Ala | Gly | Ser | Val | Arg | Leu | Leu | Thr | Glu | Asn | Thr | Pro | Trp |
| | | | 420 | | | | | 425 | | | | | 430 | | |
| ccg | gac | agt | ggt | cgt | cct | tgc | cgg | gtg | ggg | gtg | tcg | tcg | ttc | ggg | atc |
| Pro | Asp | Ser | Gly | Arg | Pro | Cys | Arg | Val | Gly | Val | Ser | Ser | Phe | Gly | Ile |
| | | 435 | | | | | 440 | | | | | 445 | | | |
| agc | ggc | acc | aac | gca | cat | gtg | att | ctc | gaa | cag | tct | cca | gtc | gag | cag |
| Ser | Gly | Thr | Asn | Ala | His | Val | Ile | Leu | Glu | Gln | Ser | Pro | Val | Glu | Gln |
| | 450 | | | | | 455 | | | | | 460 | | | | |
| ggc | gaa | ccg | gcc | ggg | ccg | gtc | gaa | ggc | gag | cgg | gaa | ccg | gat | gta | gcc |
| Gly | Glu | Pro | Ala | Gly | Pro | Val | Glu | Gly | Glu | Arg | Glu | Pro | Asp | Val | Ala |
| 465 | | | | | 470 | | | | 475 | | | | | | 480 |
| gtc | ccc | gtg | gtg | cct | tgg | gtg | ctg | tcg | ggt | aag | aca | ccg | gag | gct | gcg |
| Val | Pro | Val | Val | Pro | Trp | Val | Leu | Ser | Gly | Lys | Thr | Pro | Glu | Ala | Ala |
| | | | | 485 | | | | | 490 | | | | | 495 | |
| cgg | gcg | cag | gcc | gaa | cgg | gtg | cat | tcg | cat | atc | gag | gac | cgg | ccg | ggg |
| Arg | Ala | Gln | Ala | Glu | Arg | Val | His | Ser | His | Ile | Glu | Asp | Arg | Pro | Gly |
| | | | 500 | | | | | 505 | | | | | 510 | | |
| ctg | tcg | ccg | gtg | gat | gtg | gcg | tat | tcg | cta | gga | atg | aca | cgc | gcg | gcg |
| Leu | Ser | Pro | Val | Asp | Val | Ala | Tyr | Ser | Leu | Gly | Met | Thr | Arg | Ala | Ala |
| | | 515 | | | | | 520 | | | | | 525 | | | |
| ctg | gat | gaa | cgc | gca | gtg | gtg | ttg | ggc | tcg | gac | cgt | gcc | gcg | ctc | ctg |
| Leu | Asp | Glu | Arg | Ala | Val | Val | Leu | Gly | Ser | Asp | Arg | Ala | Ala | Leu | Leu |
| | 530 | | | | | 535 | | | | | 540 | | | | |
| acc | ggg | ttg | agg | gca | ttc | gcc | gac | ggc | tgc | gat | gcg | ccc | gaa | gtg | gtt |
| Thr | Gly | Leu | Arg | Ala | Phe | Ala | Asp | Gly | Cys | Asp | Ala | Pro | Glu | Val | Val |
| 545 | | | | | 550 | | | | 555 | | | | | | 560 |
| tcg | ggg | tct | gtg | ggg | ctt | ggt | ggc | cgc | gtc | ggg | ttc | gtg | ttc | tcg | ggt |
| Ser | Gly | Ser | Val | Gly | Leu | Gly | Gly | Arg | Val | Gly | Phe | Val | Phe | Ser | Gly |
| | | | | 565 | | | | | 570 | | | | | 575 | |
| cag | ggt | ggt | cag | tgg | ccg | ggg | atg | ggc | cgg | ggg | ctc | tac | tcg | gtg | ttt |
| Gln | Gly | Gly | Gln | Trp | Pro | Gly | Met | Gly | Arg | Gly | Leu | Tyr | Ser | Val | Phe |
| | | | 580 | | | | | 585 | | | | | 590 | | |
| ccg | gtg | ttc | gcc | gac | gcg | ttc | gac | gag | gct | tgc | gcg | gag | ttg | gat | gca |
| Pro | Val | Phe | Ala | Asp | Ala | Phe | Asp | Glu | Ala | Cys | Ala | Glu | Leu | Asp | Ala |
| | | 595 | | | | | 600 | | | | | 605 | | | |
| cac | ctg | ggc | cag | gaa | ctg | cgg | gtt | cgg | gat | gtg | gtg | ttc | ggt | tcg | caa |
| His | Leu | Gly | Gln | Glu | Leu | Arg | Val | Arg | Asp | Val | Val | Phe | Gly | Ser | Gln |
| | 610 | | | | | 615 | | | | | 620 | | | | |

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|-------------------|------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|------|
| gcg Ala 625 | tgg Trp | ttg Leu | ctg Leu | gat Asp | cgg Arg 630 | acg Thr | gtg Val | tgg Trp | gcg Ala | cag Gln 635 | tcg Ser | ggt Gly | ttg Leu | ttc Phe | gcg Ala 640 | 1920 |
| ttg Leu | cag Gln | att Ile | ggc Gly 645 | ttg Leu | ctg Leu | cgg Arg | ctg Leu | ctg Leu | ggt Gly 650 | tcg Ser | tgg Trp | ggt Gly | gtt Val | cgg Arg 655 | ccg Pro | 1968 |
| gat Asp | gtg Val | gtg Val | ttg Leu 660 | ggg Gly | cac His | tcg Ser | gtg Val | ggt Gly 665 | gag Glu | ctg Leu | gct Ala | gcg Ala | gtg Val 670 | cat His | gcg Ala | 2016 |
| gct Ala | ggt Gly | gtg Val 675 | ttg Leu | tcg Ser | ttg Leu | tcg Ser | gag Glu 680 | gcc Ala | gcg Ala | cgg Arg | ttg Leu | gtg Val 685 | gcg Ala | ggt Gly | cgc Arg | 2064 |
| gcc Ala 690 | cgg Arg | ttg Leu | atg Met | cag Gln | gcg Ala | ttg Leu 695 | cct Pro | tct Ser | ggt Gly | ggt Gly | gcc Ala 700 | atg Met | ctc Leu | gcg Ala | gtc Val | 2112 |
| gct Ala 705 | acg Thr | ggt Gly | gag Glu | ttt Phe | cag Gln 710 | gtc Val | gat Asp | cct Pro | ctg Leu | ctg Leu 715 | gat Asp | ggg Gly | gtg Val | cgg Arg | gac Asp 720 | 2160 |
| cgg Arg | atc Ile | ggt Gly | atc Ile | gcg Ala 725 | gcg Ala | gtg Val | aat Asn | ggc Gly | ccg Pro 730 | gaa Glu | tcg Ser | gtt Val | gtg Val | ctc Leu 735 | tct Ser | 2208 |
| ggt Gly | gac Asp | cgc Arg | gag Glu 740 | ctg Leu | ctc Leu | acc Thr | gag Glu | atc Ile 745 | gct Ala | gat Asp | cgg Arg | ttg Leu | cac His 750 | gat Asp | cag Gln | 2256 |
| ggg Gly | tgc Cys | cgg Arg 755 | acc Thr | cgg Arg | tgg Trp | ttg Leu | cgg Arg 760 | gtg Val | tcg Ser | cat His | gct Ala | ttc Phe 765 | cat His | tcg Ser | ccc Pro | 2304 |
| cat His 770 | atg Met | gag Glu | ccg Pro | atg Met | ctg Leu | gag Glu 775 | gag Glu | ttc Phe | gcc Ala | cag Gln | atc Ile 780 | tcc Ser | cga Arg | ggc Gly | cgc Arg | 2352 |
| gaa Glu 785 | tat Tyr | cac His | gca Ala | ccg Pro | gaa Glu 790 | ctg Leu | ccg Pro | atc Ile | atc Ile | tcg Ser 795 | acc Thr | ctg Leu | atc Ile | ggt Gly | gag Glu 800 | 2400 |
| ctg Leu | gac Asp | ggt Gly | ggt Gly | cga Arg 805 | gtg Val | atg Met | ggc Gly | act Thr | ccc Pro 810 | gag Glu | tac Tyr | tgg Trp | gtg Val | cgt Arg 815 | cag Gln | 2448 |
| gtg Val | cgt Arg | gag Glu | ccc Pro 820 | gtc Val | cgt Arg | ttc Phe | gcc Ala | gag Glu 825 | ggt Gly | gtc Val | cag Gln | gcg Ala | ctt Leu 830 | gtc Val | ggt Gly | 2496 |
| cag Gln | ggt Gly | gtc Val 835 | ggc Gly | acg Thr | att Ile | gtc Val | gaa Glu 840 | ttg Leu | ggt Gly | ccg Pro | gac Asp | ggg Gly 845 | gcg Ala | ttg Leu | tcg Ser | 2544 |
| acg Thr 850 | ttg Leu | gtc Val | gag Glu | gag Glu | tgt Cys | gtg Val 855 | gcg Ala | gaa Glu | tcc Ser | ggg Gly | cgg Arg 860 | gtg Val | gcc Ala | ggg Gly | atc Ile | 2592 |
| ccg Pro 865 | ctg Leu | atg Met | cgc Arg | aag Lys | gac Asp 870 | cgc Arg | gac Asp | gag Glu | gcg Ala | cga Arg 875 | acc Thr | gtg Val | ctg Leu | gca Ala | gct Ala 880 | 2640 |

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|---|------|
| ttg gcg cag atc cac acc cgt ggt ggt gag gtg gac tgg cgg tcg ttt | 2688 |
| Leu Ala Gln Ile His Thr Arg Gly Gly Glu Val Asp Trp Arg Ser Phe | |
| 885 890 895 | |
| ttc gcc ggt acc ggg gcg aag caa gtc gac ctg ccc acc tac gcc ttc | 2736 |
| Phe Ala Gly Thr Gly Ala Lys Gln Val Asp Leu Pro Thr Tyr Ala Phe | |
| 900 905 910 | |
| cag cgg cag cgg tac tgg ctg gca tcc acc ggg cgt gcg ggt gac gtg | 2784 |
| Gln Arg Gln Arg Tyr Trp Leu Ala Ser Thr Gly Arg Ala Gly Asp Val | |
| 915 920 925 | |
| acc gcc gcc gga ttg gcc gag gcg gac cat ccg ctg ctc ggt gcg gtg | 2832 |
| Thr Ala Ala Gly Leu Ala Glu Ala Asp His Pro Leu Leu Gly Ala Val | |
| 930 935 940 | |
| gtt gcg ttg gca gac ggc gaa ggt gtg gtg ctg acc ggt cgg ttg aca | 2880 |
| Val Ala Leu Ala Asp Gly Glu Gly Val Val Leu Thr Gly Arg Leu Thr | |
| 945 950 955 960 | |
| gcg ggt tcg cat ccg tgg ttg tcc gat cac cgg gtg ctg ggc gaa atc | 2928 |
| Ala Gly Ser His Pro Trp Leu Ser Asp His Arg Val Leu Gly Glu Ile | |
| 965 970 975 | |
| gtc gtc ccc ggc acc gcg atc gtc gag ctg gtg tgg cac gtc ggc gag | 2976 |
| Val Val Pro Gly Thr Ala Ile Val Glu Leu Val Trp His Val Gly Glu | |
| 980 985 990 | |
| cgc ctc ggt tgt ggc cgg gtg gaa ctg gct ttg gaa gcg ccc ctg | 3024 |
| Arg Leu Gly Cys Gly Arg Val Glu Glu Leu Ala Leu Ala Pro Leu | |
| 995 1000 1005 | |
| atc ctg ccg gat cat gga gcg gtc cag gtt cag gtg ctg gtg gga ccg | 3072 |
| Ile Leu Pro Asp His Gly Ala Val Gln Val Gln Val Leu Val Gly Pro | |
| 1010 1015 1020 | |
| ccc ggg gaa tcc gga gcc cgg tcg gtg gcg ctc tac tcc tgt cct ggc | 3120 |
| Pro Gly Glu Ser Gly Ala Arg Ser Val Ala Leu Tyr Ser Cys Pro Gly | |
| 1025 1030 1035 1040 | |
| gag gcg atc gaa ccc gag tgg aag aag cac gcg acg ggc gtg ctt ctc | 3168 |
| Glu Ala Ile Glu Pro Glu Trp Lys Lys His Ala Thr Gly Val Leu Leu | |
| 1045 1050 1055 | |
| cca ccc gtg gcc gcc gag aac cat gag ctg acc gca tgg ccc ccg gag | 3216 |
| Pro Pro Val Ala Ala Glu Asn His Glu Leu Thr Ala Trp Pro Pro Glu | |
| 1060 1065 1070 | |
| aat gcg acc gaa atc gat gca gac ggg gtc tac gca ttc ctt gaa ggg | 3264 |
| Asn Ala Thr Glu Ile Asp Ala Asp Gly Val Tyr Ala Phe Leu Glu Gly | |
| 1075 1080 1085 | |
| cac ggt ttc gcg tac gga ccg gcc ttt aga tgt ctg cgc ggt gcc tgg | 3312 |
| His Gly Phe Ala Tyr Gly Pro Ala Phe Arg Cys Leu Arg Gly Ala Trp | |
| 1090 1095 1100 | |
| cga cga ggc ggg gag gtg ttc gcc gaa gtc gca ttg ccg gat gac atg | 3360 |
| Arg Arg Gly Gly Glu Val Phe Ala Glu Val Ala Leu Pro Asp Asp Met | |
| 1105 1110 1115 1120 | |
| cag gcg ggg gtc gat cga ttc ggc gtc cac ccc gcg ttg ctg gac gcg | 3408 |
| Gln Ala Gly Val Asp Arg Phe Gly Val His Pro Ala Leu Leu Asp Ala | |

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| 1125 | 1130 | 1135 | |
|---|------|------|------|
| gtt ctg cat gcc gcc gca gcc gag acg tcg gtg gtc cag agc gaa gcg Val Leu His Ala Ala Ala Ala Glu Thr Ser Val Val Gln Ser Glu Ala 1140 1145 1150 | | | 3456 |
| cgg gtg ccg ttc tcg tgg cgt ggg gtg gaa ctt cgc gcc act gaa agc Arg Val Pro Phe Ser Trp Arg Gly Val Glu Leu Arg Ala Thr Glu Ser 1155 1160 1165 | | | 3504 |
| gcg gtg gtg cgg gcg cgc ctc tcg ttg act tcg gat gac gaa ctg tcg Ala Val Val Arg Ala Arg Leu Ser Leu Thr Ser Asp Asp Glu Leu Ser 1170 1175 1180 | | | 3552 |
| ttg gtc gca gtg gac ccg gct ggc cga ttc gtg gcc acg gtt gat tcg Leu Val Ala Val Asp Pro Ala Gly Arg Phe Val Ala Thr Val Asp Ser 1185 1190 1195 1200 | | | 3600 |
| ctg gtg acc cga ccg atc tcc cgg cag cag gtg agg tct ggc gcg atc Leu Val Thr Arg Pro Ile Ser Arg Gln Gln Val Arg Ser Gly Ala Ile 1205 1210 1215 | | | 3648 |
| ggc gat tgc ctg ttc gag gtg gag tgg cac cgg aag gcg ttg ttg gga Gly Asp Cys Leu Phe Glu Val Glu Trp His Arg Lys Ala Leu Leu Gly 1220 1225 1230 | | | 3696 |
| aca acc gcc ggc gac gac ctt gcc atc gtc ggt gac ggt ccc agt tgg Thr Thr Ala Gly Asp Asp Leu Ala Ile Val Gly Asp Gly Pro Ser Trp 1235 1240 1245 | | | 3744 |
| ccg gaa tcg gtg cgc gca acc gca cgg ttc gcg acc ctg gat gag ttc Pro Glu Ser Val Arg Ala Thr Ala Arg Phe Ala Thr Leu Asp Glu Phe 1250 1255 1260 | | | 3792 |
| cgt gcg gcc gtg gac tcg gac gtt cct gcc ccg ggt tcg gtg ttg gtc Arg Ala Ala Val Asp Ser Asp Val Pro Ala Pro Gly Ser Val Leu Val 1265 1270 1275 1280 | | | 3840 |
| gca gct atg tcg gcc gaa gag gtc gag ggt gga tcc ctg ccg tcg cgc Ala Ala Met Ser Ala Glu Glu Val Glu Gly Gly Ser Leu Pro Ser Arg 1285 1290 1295 | | | 3888 |
| gcc caa gag tcg acc tcc gat ctg ctg gct ctc gtg cag tcg tgg ctt Ala Gln Glu Ser Thr Ser Asp Leu Leu Ala Leu Val Gln Ser Trp Leu 1300 1305 1310 | | | 3936 |
| gcg gac gag ccg ttc gcc gaa tcc cag ctc gtg gtc gtc acg cgt gca Ala Asp Glu Arg Phe Ala Glu Ser Gln Leu Val Val Val Thr Arg Ala 1315 1320 1325 | | | 3984 |
| gcg gtg tcg gcc gac tcg gat tcg gac gtc gcg gac ctg gtg ggt gcg Ala Val Ser Ala Asp Ser Asp Ser Asp Val Ala Asp Leu Val Gly Ala 1330 1335 1340 | | | 4032 |
| tcg tcg tgg ggg ttg ttg agt tca gcc cag tcg gag aac ccg ggt cgc Ser Ser Trp Gly Leu Leu Ser Ser Ala Gln Ser Glu Asn Pro Gly Arg 1345 1350 1355 1360 | | | 4080 |
| ttc gtg ctg gtg gac gtg gac ggc aca cct gag tcg tgg cag gcg ttg Phe Val Leu Val Asp Val Asp Gly Thr Pro Glu Ser Trp Gln Ala Leu 1365 1370 1375 | | | 4128 |
| ccg gcc gcc gtg cga gca gga gaa ccg cag ctg gca ctt cgg cgc ggc | | | 4176 |

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|-----|------|------|------|------|------|------|------|------|------|------|------|------|------|-----|------|------|--|
| Pro | Ala | Ala | Val | Arg | Ala | Gly | Glu | Pro | Gln | Leu | Ala | Leu | Arg | Arg | Gly | | |
| | | | 1380 | | | | | 1385 | | | | | 1390 | | | | |
| gtg | gcg | ctg | gtg | cct | cgg | ttg | gcg | cga | ctc | acg | gtg | cgc | gag | gag | ggc | 4224 | |
| Val | Ala | Leu | Val | Pro | Arg | Leu | Ala | Arg | Leu | Thr | Val | Arg | Glu | Glu | Gly | | |
| | | 1395 | | | | | 1400 | | | | | 1405 | | | | | |
| tcc | tcc | ccg | caa | ctc | gac | acg | gac | ggg | acc | gtc | ctc | atc | acg | ggt | ggc | 4272 | |
| Ser | Ser | Pro | Gln | Leu | Asp | Thr | Asp | Gly | Thr | Val | Leu | Ile | Thr | Gly | Gly | | |
| | | 1410 | | | | 1415 | | | | | 1420 | | | | | | |
| acc | ggt | gcg | ttg | ggg | gga | gtg | gtt | gcc | cgt | cac | ctg | gtg | gag | gag | cac | 4320 | |
| Thr | Gly | Ala | Leu | Gly | Gly | Val | Val | Ala | Arg | His | Leu | Val | Glu | Glu | His | | |
| | 1425 | | | 1430 | | | | | 1435 | | | | | | 1440 | | |
| ggg | att | cgg | cgt | ttg | gtg | ttg | gca | ggc | cgg | cgt | ggc | tgg | aat | gcg | cct | 4368 | |
| Gly | Ile | Arg | Arg | Leu | Val | Leu | Ala | Gly | Arg | Arg | Gly | Trp | Asn | Ala | Pro | | |
| | | | 1445 | | | | | 1450 | | | | | 1455 | | | | |
| gga | gtc | cac | gag | ttg | gtg | gat | gag | ctg | gcg | cgc | gcg | ggc | gcc | gtg | gtt | 4416 | |
| Gly | Val | His | Glu | Leu | Val | Asp | Glu | Leu | Ala | Arg | Ala | Gly | Ala | Val | Val | | |
| | | | 1460 | | | | 1465 | | | | | 1470 | | | | | |
| gag | gtg | gtg | gct | tgc | gat | gtg | gct | gac | cgc | acc | gat | ctg | gag | cac | gtg | 4464 | |
| Glu | Val | Val | Ala | Cys | Asp | Val | Ala | Asp | Arg | Thr | Asp | Leu | Glu | His | Val | | |
| | 1475 | | | | | 1480 | | | | | | 1485 | | | | | |
| ctg | gcc | gcc | att | ccg | gtc | gac | tgg | ccg | ctg | cgg | ggg | atc | gtg | cat | acc | 4512 | |
| Leu | Ala | Ala | Ile | Pro | Val | Asp | Trp | Pro | Leu | Arg | Gly | Ile | Val | His | Thr | | |
| | 1490 | | | | 1495 | | | | | | 1500 | | | | | | |
| gct | ggg | gtg | ctg | gcc | gac | gga | gtg | atc | ggg | tcc | ttg | tcg | gcg | gcg | gat | 4560 | |
| Ala | Gly | Val | Leu | Ala | Asp | Gly | Val | Ile | Gly | Ser | Leu | Ser | Ala | Ala | Asp | | |
| | 1505 | | | 1510 | | | | | 1515 | | | | | | 1520 | | |
| gtg | ggc | acg | gtg | ttt | gcc | ccg | aag | gtg | acg | ggg | gca | tgg | cat | ctg | cac | 4608 | |
| Val | Gly | Thr | Val | Phe | Ala | Pro | Lys | Val | Thr | Gly | Ala | Trp | His | Leu | His | | |
| | | | 1525 | | | | | 1530 | | | | | 1535 | | | | |
| gag | ttg | acc | cgc | gat | ctg | gat | ctg | tcg | ttc | ttc | gtt | ctt | ttc | tct | tcc | 4656 | |
| Glu | Leu | Thr | Arg | Asp | Leu | Asp | Leu | Ser | Phe | Phe | Val | Leu | Phe | Ser | Ser | | |
| | | 1540 | | | | | 1545 | | | | | 1550 | | | | | |
| ttc | tcc | ggg | att | gcg | ggt | gcc | gca | ggg | cag | gcc | aac | tac | gcg | gcg | gcg | 4704 | |
| Phe | Ser | Gly | Ile | Ala | Gly | Ala | Ala | Gly | Gln | Ala | Asn | Tyr | Ala | Ala | Ala | | |
| | | 1555 | | | | 1560 | | | | | 1565 | | | | | | |
| aac | acg | ttc | ctg | gat | gca | ttg | gcg | cgt | tat | cgc | cgg | gcg | cgt | ggg | ctg | 4752 | |
| Asn | Thr | Phe | Leu | Asp | Ala | Leu | Ala | Arg | Tyr | Arg | Arg | Ala | Arg | Gly | Leu | | |
| | 1570 | | | | 1575 | | | | | 1580 | | | | | | | |
| cct | ggg | ttg | tcg | ttg | gcg | tgg | gga | ctg | tgg | gcg | caa | ccc | agc | ggt | atg | 4800 | |
| Pro | Gly | Leu | Ser | Leu | Ala | Trp | Gly | Leu | Trp | Ala | Gln | Pro | Ser | Gly | Met | | |
| | 1585 | | | 1590 | | | | 1595 | | | | | | | 1600 | | |
| acg | agt | ggc | ttg | gac | gcg | gcg | tcg | gtg | gag | cgg | ttg | gcg | cgg | acg | ggc | 4848 | |
| Thr | Ser | Gly | Leu | Asp | Ala | Ala | Ser | Val | Glu | Arg | Leu | Ala | Arg | Thr | Gly | | |
| | | | 1605 | | | | | 1610 | | | | 1615 | | | | | |
| atc | gca | gaa | ctt | tcc | acg | gag | gat | gga | ctc | cgc | ctg | ttc | gat | gcc | gcg | 4896 | |
| Ile | Ala | Glu | Leu | Ser | Thr | Glu | Asp | Gly | Leu | Arg | Leu | Phe | Asp | Ala | Ala | | |
| | | 1620 | | | | | 1625 | | | | | 1630 | | | | | |

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|---|------|
| ttc gcg aag gac cgg gct tgc gtc gtt gcc gct cga ttg gac agg gcg | 4944 |
| Phe Ala Lys Asp Arg Ala Cys Val Val Ala Ala Arg Leu Asp Arg Ala | |
| 1635 1640 1645 | |
| ctg ctg gtc ggg aac gga cga tgc cac gcg att ccg gcg ctg ttg agc | 4992 |
| Leu Leu Val Gly Asn Gly Arg Ser His Ala Ile Pro Ala Leu Leu Ser | |
| 1650 1655 1660 | |
| gcg ttg gtt cct gtt cgc ggc ggt gtg gcg agg aaa aca gcc aat tct | 5040 |
| Ala Leu Val Pro Val Arg Gly Gly Val Ala Arg Lys Thr Ala Asn Ser | |
| 1665 1670 1675 1680 | |
| cag gcc gcg gat gag gac gca ctg ttg ggt ttg gtg ccg gag cac gtt | 5088 |
| Gln Ala Ala Asp Glu Asp Ala Leu Leu Gly Leu Val Arg Glu His Val | |
| 1685 1690 1695 | |
| tcg gcc gtg ctg ggt tat tgc ggt gcg gtc gag gtt ggg ggc gac cgt | 5136 |
| Ser Ala Val Leu Gly Tyr Ser Gly Ala Val Glu Val Gly Gly Asp Arg | |
| 1700 1705 1710 | |
| gct ttc cgt gat ctg ggt ttt gat tgc ttg tct ggc gtg gag ttg ccg | 5184 |
| Ala Phe Arg Asp Leu Gly Phe Asp Ser Leu Ser Gly Val Glu Leu Arg | |
| 1715 1720 1725 | |
| aac cgc ctt gcc ggg gtg ctg ggg gtg ccg ttg ccg gcg act gcg gtg | 5232 |
| Asn Arg Leu Ala Gly Val Leu Gly Val Arg Leu Pro Ala Thr Ala Val | |
| 1730 1735 1740 | |
| ttc gac tat ccg acg ccg cgg gcg ctg gcg cgt ttc ctg cat cag gaa | 5280 |
| Phe Asp Tyr Pro Thr Pro Arg Ala Leu Ala Arg Phe Leu His Gln Glu | |
| 1745 1750 1755 1760 | |
| ctg gca ggc gag gtc gcg tcc acg tgc acg ccg gtg acc agg gca gcg | 5328 |
| Leu Ala Gly Glu Val Ala Ser Thr Ser Thr Pro Val Thr Arg Ala Ala | |
| 1765 1770 1775 | |
| agt gcc gaa gag gat ctt gtt gcg att gtc ggg atg gga tgt cgt ttt | 5376 |
| Ser Ala Glu Glu Asp Leu Val Ala Ile Val Gly Met Gly Cys Arg Phe | |
| 1780 1785 1790 | |
| ccg ggt ggg gtg tgc tgc ccg gag gag ctt tgg ccg ctg gtg gcc ggc | 5424 |
| Pro Gly Gly Val Ser Ser Pro Glu Glu Leu Trp Arg Leu Val Ala Gly | |
| 1795 1800 1805 | |
| ggc gtg gat gcg gtg gct ggg ttc cca gac gat cgc ggc tgg gat ctc | 5472 |
| Gly Val Asp Ala Val Ala Gly Phe Pro Asp Asp Arg Gly Trp Asp Leu | |
| 1810 1815 1820 | |
| gcg gcg ttg tac gat cct gat ccc gat cgt ctc ggg acc tgc tat gtg | 5520 |
| Ala Ala Leu Tyr Asp Pro Asp Pro Asp Arg Leu Gly Thr Ser Tyr Val | |
| 1825 1830 1835 1840 | |
| tgt gag ggc ggg ttt ctg cgg gac gcg gcg gag ttc gat gct gac atg | 5568 |
| Cys Glu Gly Gly Phe Leu Arg Asp Ala Ala Glu Phe Asp Ala Asp Met | |
| 1845 1850 1855 | |
| ttc ggc atc agc ccg cgt gag gcg ttg gcg atg gat ccg cag cag ccg | 5616 |
| Phe Gly Ile Ser Pro Arg Glu Ala Leu Ala Met Asp Pro Gln Gln Arg | |
| 1860 1865 1870 | |
| ttg ctg ctg gag gtc gcc tgg gaa acc ttg gag ccg gct ggg atc gat | 5664 |
| Leu Leu Leu Glu Val Ala Trp Glu Thr Leu Glu Arg Ala Gly Ile Asp | |
| 1875 1880 1885 | |

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|---|------|
| ccg ttc tcg ttg cac ggc agc cgg acc ggt gtg ttc gcg ggc ttg atg Pro Phe Ser Leu His Gly Ser Arg Thr Gly Val Phe Ala Gly Leu Met 1890 1895 1900 | 5712 |
| tac cac gac tat ggg gcc cga ttc att acc aga gca ccg gag ggc ttc Tyr His Asp Tyr Gly Ala Arg Phe Ile Thr Arg Ala Pro Glu Gly Phe 1905 1910 1915 1920 | 5760 |
| gaa ggg cac ctc ggg acg ggc aat gcg ggg agc gtg ctg tcg ggt cgg Glu Gly His Leu Gly Thr Gly Asn Ala Gly Ser Val Leu Ser Gly Arg 1925 1930 1935 | 5808 |
| gtt gcg tat tcg ttt ggt ttc gag ggt cct gcg gtg acg gtg gat acg Val Ala Tyr Ser Phe Gly Phe Glu Gly Pro Ala Val Thr Val Asp Thr 1940 1945 1950 | 5856 |
| gcg tgt tcg tcg ttg gtg gcg tta cac ctg gcg ggt caa gca ctg Ala Cys Ser Ser Leu Val Ala Leu His Leu Ala Gly Gln Ala Leu 1955 1960 1965 | 5904 |
| cgg gcc ggt gag tgc gaa ttc gcc ctt gcc ggt ggc gtc acg gtg atg Arg Ala Gly Glu Cys Glu Phe Ala Leu Ala Gly Gly Val Thr Val Met 1970 1975 1980 | 5952 |
| tcg acg ccg acg acg ttc gtg gag ttc tcc cgt caa ccg ggt ctg gct Ser Thr Pro Thr Thr Phe Val Glu Phe Ser Arg Gln Arg Gly Leu Ala 1985 1990 1995 2000 | 6000 |
| ccg gat ggg ccg tgc aag tcg ttc gcg gcg gcc gcg gat ggc acc ggg Pro Asp Gly Arg Cys Lys Ser Phe Ala Ala Ala Asp Gly Thr Gly 2005 2010 2015 | 6048 |
| tgg ggc gag ggt gcc ggt ctg gtg ttg ctg gag ccg ttg tcg gat gcc Trp Gly Glu Gly Ala Gly Leu Val Leu Leu Glu Arg Leu Ser Asp Ala 2020 2025 2030 | 6096 |
| cgg cgc aat ggg cac gag gtt ctg gcg gtg gtg ccg ggt agc gcg gtg Arg Arg Asn Gly His Glu Val Leu Ala Val Val Arg Gly Ser Ala Val 2035 2040 2045 | 6144 |
| aac cag gac ggc gcg tcg aat ggc ttg act gcg cca aat ggt ccg tca Asn Gln Asp Gly Ala Ser Asn Gly Leu Thr Ala Pro Asn Gly Pro Ser 2050 2055 2060 | 6192 |
| cag caa agg gtg atc acc cag gca ctc acg agt gcc ggg ctg tcc gtg Gln Gln Arg Val Ile Thr Gln Ala Leu Thr Ser Ala Gly Leu Ser Val 2065 2070 2075 2080 | 6240 |
| tcc gac gtg gat gct gtg gag gcg cat ggg acg ggc acg ccg ctt ggt Ser Asp Val Asp Ala Val Glu Ala His Gly Thr Gly Thr Arg Leu Gly 2085 2090 2095 | 6288 |
| gat ccg atc gag gcg cag gcg ttg atc gct acg tac ggc ccg gat cgt Asp Pro Ile Glu Ala Gln Ala Leu Ile Ala Thr Tyr Gly Arg Asp Arg 2100 2105 2110 | 6336 |
| gat ccc ggt ccg ccg ttg tgg ctg ggg tcg gtg aag tcg aat att ggt Asp Pro Gly Arg Pro Leu Trp Leu Gly Ser Val Lys Ser Asn Ile Gly 2115 2120 2125 | 6384 |
| cac acc cag gcg gcg gcg ggt gtc gct ggt gtg atc aag atg gtg atg His Thr Gln Ala Ala Ala Gly Val Ala Gly Val Ile Lys Met Val Met 2130 2135 2140 2145 | 6432 |

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|---|------|------|------|
| 2130 | 2135 | 2140 | |
| gcg atg cgg cag ggg gag ctg ccg cgc acg ttg cac gtg gac gag ccc | | | 6480 |
| Ala Met Arg Gln Gly Glu Leu Pro Arg Thr Leu His Val Asp Glu Pro | | | |
| 2145 | 2150 | 2155 | 2160 |
| tcc gcg cag gtg gac tgg tct gcg ggc acg gtc caa ctc ctc acg gag | | | 6528 |
| Ser Ala Gln Val Asp Trp Ser Ala Gly Thr Val Gln Leu Leu Thr Glu | | | |
| | 2165 | 2170 | 2175 |
| aac acg ccc tgg ccc gac agc ggt cgt ctt cgc cgg gcg ggc gtg tca | | | 6576 |
| Asn Thr Pro Trp Pro Asp Ser Gly Arg Leu Arg Arg Ala Gly Val Ser | | | |
| | 2180 | 2185 | 2190 |
| tcg ttc ggg atc agt ggc acc aac gcg cac ctg atc ctt gaa caa cct | | | 6624 |
| Ser Phe Gly Ile Ser Gly Thr Asn Ala His Leu Ile Leu Glu Gln Pro | | | |
| | 2195 | 2200 | 2205 |
| ccg cga gag tcg cag cgc tca aca gag ccg gat tcg ggt tct gtc cgc | | | 6672 |
| Pro Arg Glu Ser Gln Arg Ser Thr Glu Pro Asp Ser Gly Ser Val Arg | | | |
| | 2210 | 2215 | 2220 |
| gat ttt ccg gtg gtg ccg tgg atg gtg tcg ggc aaa aca ccc gaa gcg | | | 6720 |
| Asp Phe Pro Val Val Pro Trp Met Val Ser Gly Lys Thr Pro Glu Ala | | | |
| | 2225 | 2230 | 2235 |
| cta tcc gcc cag gca gat gca ttg atg tcc tac ttg agc aat cgc gtt | | | 6768 |
| Leu Ser Ala Gln Ala Asp Ala Leu Met Ser Tyr Leu Ser Asn Arg Val | | | |
| | 2245 | 2250 | 2255 |
| gat gct tcc ccg cga gat atc ggt tat tcg ctt gcg gtg acc cgt ccg | | | 6816 |
| Asp Ala Ser Pro Arg Asp Ile Gly Tyr Ser Leu Ala Val Thr Arg Pro | | | |
| | 2260 | 2265 | 2270 |
| gcg ttg gac cac cgc gct gtc gtg ctg ggt gcg gat cgt gcc gcg ttg | | | 6864 |
| Ala Leu Asp His Arg Ala Val Val Leu Gly Ala Asp Arg Ala Ala Leu | | | |
| | 2275 | 2280 | 2285 |
| ctg ccg ggc ttg aaa gcg ctg gcc gtt agt aat gac gct gcc gag gtg | | | 6912 |
| Leu Pro Gly Leu Lys Ala Leu Ala Val Ser Asn Asp Ala Ala Glu Val | | | |
| | 2290 | 2295 | 2300 |
| atc acc ggc act cgt gcc gct ggg ccg gtc gga ttc gtg ttc tcc ggt | | | 6960 |
| Ile Thr Gly Thr Arg Ala Ala Gly Pro Val Gly Phe Val Phe Ser Gly | | | |
| | 2305 | 2310 | 2315 |
| caa ggt ggt cag tgg ccc ggg atg gga agc ggg ctc cac tcg gcg ttt | | | 7008 |
| Gln Gly Gly Gln Trp Pro Gly Met Gly Ser Gly Leu His Ser Ala Phe | | | |
| | 2325 | 2330 | 2335 |
| ccg gtg ttc gcc gac gcg ttt gac gaa gcc tgc tgc gag ctg gat gcg | | | 7056 |
| Pro Val Phe Ala Asp Ala Phe Asp Glu Ala Cys Cys Glu Leu Asp Ala | | | |
| | 2340 | 2345 | 2350 |
| cat ctc ggg cag atg gcc cgg cta cga gat gtg ttg tcc ggt tcg gat | | | 7104 |
| His Leu Gly Gln Met Ala Arg Leu Arg Asp Val Leu Ser Gly Ser Asp | | | |
| | 2355 | 2360 | 2365 |
| acg caa ctt ctg gac cag acc ttg tgg gcg cag ccg ggc ctg ttc gcg | | | 7152 |
| Thr Gln Leu Leu Asp Gln Thr Leu Trp Ala Gln Pro Gly Leu Phe Ala | | | |
| | 2370 | 2375 | 2380 |
| ttg caa gtc gga ctc tgg gag ttg ttg ggt tcg tgg ggt gtc cgg ccc | | | 7200 |

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|---|------|
| Leu Gln Val Gly Leu Trp Glu Leu Leu Gly Ser Trp Gly Val Arg Pro | |
| 2385 2390 2395 2400 | |
| gct gtg gtg ctg ggc cac tcg gtc ggt gag ctg gcg gcg gcg ttc gcg | 7248 |
| Ala Val Val Leu Gly His Ser Val Gly Glu Leu Ala Ala Ala Phe Ala | |
| 2405 2410 2415 | |
| gct gga gtg ttg tcg ttg cgg gat gcg gct cgg ctg gtg gcg ggc cgt | 7296 |
| Ala Gly Val Leu Ser Leu Arg Asp Ala Ala Arg Leu Val Ala Gly Arg | |
| 2420 2425 2430 | |
| gcc cgg ttg atg caa gcc ctg cca act ggc ggt gcc atg ctc gct gcg | 7344 |
| Ala Arg Leu Met Gln Ala Leu Pro Thr Gly Gly Ala Met Leu Ala Ala | |
| 2435 2440 2445 | |
| gct gct gga gag gag cag ctg cgc ccg ttg ctg gcc gac tgc ggt gat | 7392 |
| Ala Ala Gly Glu Glu Gln Leu Arg Pro Leu Leu Ala Asp Cys Gly Asp | |
| 2450 2455 2460 | |
| cgt gtg ggg atc gcc gcg gtc aac gct ccc ggg tcg gtg gtg ctc tcc | 7440 |
| Arg Val Gly Ile Ala Ala Val Asn Ala Pro Gly Ser Val Val Leu Ser | |
| 2465 2470 2475 2480 | |
| ggt gat cgg gat gtg ctc gat gac att gcc ggt cgg ctg gac ggg caa | 7488 |
| Gly Asp Arg Asp Val Leu Asp Asp Ile Ala Gly Arg Leu Asp Gly Gln | |
| 2485 2490 2495 | |
| ggg atc cgg tcc agg tgg ttg cgg gtt tcg cat gcg ttt cat tcg cat | 7536 |
| Gly Ile Arg Ser Arg Trp Leu Arg Val Ser His Ala Phe His Ser His | |
| 2500 2505 2510 | |
| cgg atg gat ccg atg ctg gcg gag ttc acc gaa atc gcc cgg agc gtg | 7584 |
| Arg Met Asp Pro Met Leu Ala Glu Phe Thr Glu Ile Ala Arg Ser Val | |
| 2515 2520 2525 | |
| gac tac cgg tcg tca ggg ctg ccg atc gtg tcg acg ttg acg ggt gag | 7632 |
| Asp Tyr Arg Ser Ser Gly Glu Pro Ile Val Ser Thr Leu Thr Gly Glu | |
| 2530 2535 2540 | |
| ctc gat gag gtc ggc atg ccg gct acg ccg gag tat tgg gtg cgc cag | 7680 |
| Leu Asp Glu Val Gly Met Pro Ala Thr Pro Glu Tyr Trp Val Arg Gln | |
| 2545 2550 2555 2560 | |
| gtg cga gaa ccc gtc cgc ttc gcc gac ggt gtt gct gcg ctc gcg gct | 7728 |
| Val Arg Glu Pro Val Arg Phe Ala Asp Gly Val Ala Ala Leu Ala Ala | |
| 2565 2570 2575 | |
| cac ggt gtg agc acc gtc gtc gag gtc ggt ccg gat ggg gtg ttg tcg | 7776 |
| His Gly Val Ser Thr Val Val Glu Val Gly Pro Asp Gly Val Leu Ser | |
| 2580 2585 2590 | |
| gcg ctg gtg cag gag tgc gcg gcc gga tcc gat cag ggc gga cgg gtg | 7824 |
| Ala Leu Val Gln Glu Cys Ala Ala Gly Ser Asp Gln Gly Gly Arg Val | |
| 2595 2600 2605 | |
| gcc gcg gtt ccg ctc atg cgc agc aat cgc gac gag gcg cac acg gtg | 7872 |
| Ala Ala Val Pro Leu Met Arg Ser Asn Arg Asp Glu Ala His Thr Val | |
| 2610 2615 2620 | |
| aca acg gca ttg gcg cag atc cat gtg cgt ggt gct gag gtg gac tgg | 7920 |
| Thr Thr Ala Leu Ala Gln Ile His Val Arg Gly Ala Glu Val Asp Trp | |
| 2625 2630 2635 2640 | |

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|---|------|
| cgg tcg ttt ttc gcc ggt acc ggg gca aag cag gtc gag ctg ccc acg | 7968 |
| Arg Ser Phe Phe Ala Gly Thr Gly Ala Lys Gln Val Glu Leu Pro Thr | |
| 2645 2650 2655 | |
| tat gcc ttc caa cga cag cgg tac tgg ctt gac tca cca tcc gaa ccg | 8016 |
| Tyr Ala Phe Gln Arg Gln Arg Tyr Trp Leu Asp Ser Pro Ser Glu Pro | |
| 2660 2665 2670 | |
| gtc ggg caa tcc gcc gat ccc gcg cgc cag tcg ggc ttc tgg gaa ctc | 8064 |
| Val Gly Gln Ser Ala Asp Pro Ala Arg Gln Ser Gly Phe Trp Glu Leu | |
| 2675 2680 2685 | |
| gtc gag cag gaa gat gtc agc gcg ctc agc gcc gct ctg cac att acc | 8112 |
| Val Glu Gln Glu Asp Val Ser Ala Leu Ser Ala Ala Leu His Ile Thr | |
| 2690 2695 2700 | |
| ggc gat cac gac gtg cag gcg tcc ctg gaa tcg gtg gtt ccg gtc ctc | 8160 |
| Gly Asp His Asp Val Gln Ala Ser Leu Glu Ser Val Val Pro Val Leu | |
| 2705 2710 2715 2720 | |
| tcc tcc tgg cat cgc cgg atc cgc aac gaa tcc ctg gtg cac cag tgg | 8208 |
| Ser Ser Trp His Arg Arg Ile Arg Asn Glu Ser Leu Val His Gln Trp | |
| 2725 2730 2735 | |
| cgg tac cgg att tcc tgg cat gag cgg gca gat ttg cca gac ccc tcg | 8256 |
| Arg Tyr Arg Ile Ser Trp His Glu Arg Ala Asp Leu Pro Asp Pro Ser | |
| 2740 2745 2750 | |
| ttg tcg ggg aca tgg ctc gtc gtc gtg ccg gag ggg tgg tcg gcg agt | 8304 |
| Leu Ser Gly Thr Trp Leu Val Val Val Pro Glu Gly Trp Ser Ala Ser | |
| 2755 2760 2765 | |
| cgg caa gtt ctg cgt ttc aac gag atg ttc gag gaa cgg ggt tgc ccg | 8352 |
| Arg Gln Val Leu Arg Phe Asn Glu Met Phe Glu Glu Arg Gly Cys Pro | |
| 2770 2775 2780 | |
| gca gtt ctg ttc gag ctc gcc ggg cac gac gag gaa gcc ctg gcg caa | 8400 |
| Ala Val Leu Phe Glu Leu Ala Gly His Asp Glu Glu Ala Leu Ala Gln | |
| 2785 2790 2795 2800 | |
| cga ttc cgc tcg ttg cct gtt gcg tca ggg gga ata agc ggc gtg ttg | 8448 |
| Arg Phe Arg Ser Leu Pro Val Ala Ser Gly Gly Ile Ser Gly Val Leu | |
| 2805 2810 2815 | |
| tcc ttg ctg gcg ctg gat gaa tcg ccg tcc tcg ccg aac gct gct ttg | 8496 |
| Ser Leu Leu Ala Leu Asp Glu Ser Pro Ser Ser Pro Asn Ala Ala Leu | |
| 2820 2825 2830 | |
| ccg aat ggc gcg ctg aac tcg ttg gta ctg ctg cga gct ctg cgg gcc | 8544 |
| Pro Asn Gly Ala Leu Asn Ser Leu Val Leu Leu Arg Ala Leu Arg Ala | |
| 2835 2840 2845 | |
| gcg gat gtg tcg gcg cca ttg tgg ttg gcg acg tgt ggt ggt gtc gcg | 8592 |
| Ala Asp Val Ser Ala Pro Leu Trp Leu Ala Thr Cys Gly Gly Val Ala | |
| 2850 2855 2860 | |
| gtc ggg gat gtg ccg gtg aac ccg ggg cag gcg ctg gtg tgg gga ctg | 8640 |
| Val Gly Asp Val Pro Val Asn Pro Gly Gln Ala Leu Val Trp Gly Leu | |
| 2865 2870 2875 2880 | |
| ggt cgc gtc gtc ggt ctg gag cat ccg gcc tgg tgg ggt ggc ctg gtc | 8688 |
| Gly Arg Val Val Gly Leu Glu His Pro Ala Trp Trp Gly Gly Leu Val | |
| 2885 2890 2895 | |

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|-----|------|------|------|------|------|------|------|------|-----|------|------|------|------|------|-----|------|
| gac | gtg | ccg | tgc | ttg | ctc | gat | gag | gac | gct | cga | gaa | cgc | ttg | tcg | gtc | 8736 |
| Asp | Val | Pro | Cys | Leu | Leu | Asp | Glu | Asp | Ala | Arg | Glu | Arg | Leu | Ser | Val | |
| | | 2900 | | | | | 2905 | | | | | 2910 | | | | |
| gtg | ttg | gca | ggg | ctt | ggc | gag | gac | gag | atc | gcg | gta | cgt | ccc | ggg | ggg | 8784 |
| Val | Leu | Ala | Gly | Leu | Gly | Glu | Asp | Glu | Ile | Ala | Val | Arg | Pro | Gly | Gly | |
| | | 2915 | | | | 2920 | | | | | 2925 | | | | | |
| gtg | ttc | gtg | cgg | cgg | ttg | gaa | cgc | gct | ggg | gcg | gcg | tcg | ggg | gcc | ggg | 8832 |
| Val | Phe | Val | Arg | Arg | Leu | Glu | Arg | Ala | Gly | Ala | Ala | Ser | Gly | Ala | Gly | |
| | 2930 | | | | 2935 | | | | | 2940 | | | | | | |
| tcg | gtg | tgg | cgt | cct | cgg | ggg | acg | gtg | ttg | gtg | acg | ggg | ggg | acg | ggc | 8880 |
| Ser | Val | Trp | Arg | Pro | Arg | Gly | Thr | Val | Leu | Val | Thr | Gly | Gly | Thr | Gly | |
| | 2945 | | | 2950 | | | | 2955 | | | | | | 2960 | | |
| ggg | ttg | ggg | gcg | cat | gtt | gcc | cgg | tgg | ttg | gcg | ggg | gcc | ggg | gct | gag | 8928 |
| Gly | Leu | Gly | Ala | His | Val | Ala | Arg | Trp | Leu | Ala | Gly | Ala | Gly | Ala | Glu | |
| | | | 2965 | | | | | 2970 | | | | | 2975 | | | |
| cat | gtg | gtg | ttg | acc | agc | cgt | cga | ggc | gcg | gcg | gct | ccg | ggc | gct | gga | 8976 |
| His | Val | Val | Leu | Thr | Ser | Arg | Arg | Gly | Ala | Ala | Ala | Pro | Gly | Ala | Gly | |
| | | 2980 | | | | | 2985 | | | | | 2990 | | | | |
| gat | ttg | cgg | gcg | gag | ctg | gag | gcg | ctg | ggc | gct | cgg | gtt | tcg | atc | acg | 9024 |
| Asp | Leu | Arg | Ala | Glu | Leu | Glu | Ala | Leu | Gly | Ala | Arg | Val | Ser | Ile | Thr | |
| | 2995 | | | | 3000 | | | | | | 3005 | | | | | |
| gcc | tgc | gac | gtg | gcc | gat | cgt | gac | gct | ttg | gcc | gaa | gtg | ttg | gcg | acc | 9072 |
| Ala | Cys | Asp | Val | Ala | Asp | Arg | Asp | Ala | Leu | Ala | Glu | Val | Leu | Ala | Thr | |
| | 3010 | | | | 3015 | | | | | 3020 | | | | | | |
| att | ccg | gat | gat | tgc | ccg | ctg | acc | gcg | gtg | atg | cat | gcg | gcg | ggg | gtc | 9120 |
| Ile | Pro | Asp | Asp | Cys | Pro | Leu | Thr | Ala | Val | Met | His | Ala | Ala | Gly | Val | |
| | 3025 | | | 3030 | | | | 3035 | | | | | | 3040 | | |
| gtt | gaa | gtc | ggc | gac | gtg | gcg | tcg | atg | tgt | ttg | acc | gac | ttc | gtt | ggg | 9168 |
| Val | Glu | Val | Gly | Asp | Val | Ala | Ser | Met | Cys | Leu | Thr | Asp | Phe | Val | Gly | |
| | | | 3045 | | | | | 3050 | | | | | 3055 | | | |
| gtg | ctg | tcg | gcg | aag | gca | ggg | ggg | gcg | gcg | aat | ctc | gat | gag | ttg | ctc | 9216 |
| Val | Leu | Ser | Ala | Lys | Ala | Gly | Gly | Ala | Ala | Asn | Leu | Asp | Glu | Leu | Leu | |
| | | 3060 | | | | 3065 | | | | | | 3070 | | | | |
| gcc | gat | gtc | gag | ctg | gat | gcc | ttc | gtg | ctg | ttc | tca | tcc | gtc | tcg | ggg | 9264 |
| Ala | Asp | Val | Glu | Leu | Asp | Ala | Phe | Val | Leu | Phe | Ser | Ser | Val | Ser | Gly | |
| | 3075 | | | | 3080 | | | 3085 | | | | | | | | |
| gtg | tgg | ggg | gct | ggc | ggg | cag | ggc | gct | tat | gcg | gcg | gcg | aat | gcc | tac | 9312 |
| Val | Trp | Gly | Ala | Gly | Gly | Gln | Gly | Ala | Tyr | Ala | Ala | Ala | Asn | Ala | Tyr | |
| | 3090 | | | 3095 | | | | 3100 | | | | | | | | |
| ttg | gat | gcg | ttg | gcg | cag | cgt | cgg | gca | agg | ggg | ttg | gtg | ggg | act | | 9360 |
| Leu | Asp | Ala | Leu | Ala | Gln | Arg | Arg | Ala | Arg | Gly | Leu | Val | Gly | Thr | | |
| | 3105 | | | 3110 | | | | 3115 | | | | 3120 | | | | |
| gcg | gtt | gcg | tgg | ggc | ccg | tgg | gcc | ggg | gac | gga | atg | gcc | gca | ggg | gaa | 9408 |
| Ala | Val | Ala | Trp | Gly | Pro | Trp | Ala | Gly | Asp | Gly | Met | Ala | Ala | Gly | Glu | |
| | | 3125 | | | | 3130 | | | | | | 3135 | | | | |
| ggc | ggg | gca | cag | ctg | cgc | cgg | gcc | ggc | ctg | gtg | cca | atg | gct | gcg | gat | 9456 |
| Gly | Gly | Ala | Gln | Leu | Arg | Arg | Ala | Gly | Leu | Val | Pro | Met | Ala | Ala | Asp | |

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|---|------|------|-------|
| 3140 | 3145 | 3150 | |
| cgg gcg ttg ctg gca ctt cag ggc gca ttg gat cgt gac gag aca tcc | | | 9504 |
| Arg Ala Leu Leu Ala Leu Gln Gly Ala Leu Asp Arg Asp Glu Thr Ser | | | |
| 3155 | 3160 | 3165 | |
| ctg gtc gtg gcc gat atg gcg tgg gag agg ttc gcc ccg gtg ttc gcc | | | 9552 |
| Leu Val Val Ala Asp Met Ala Trp Glu Arg Phe Ala Pro Val Phe Ala | | | |
| 3170 | 3175 | 3180 | |
| atg tcc cgt cgg cgt ccg ctg ctc gac gag ctg ccc gaa gca cag cag | | | 9600 |
| Met Ser Arg Arg Arg Pro Leu Leu Asp Glu Leu Pro Glu Ala Gln Gln | | | |
| 3185 | 3190 | 3195 | 3200 |
| gcg ttg gcg gat gcg gag aac acc act gat gct gcg gac tcg gcc gtc | | | 9648 |
| Ala Leu Ala Asp Ala Glu Asn Thr Thr Asp Ala Ala Asp Ser Ala Val | | | |
| 3205 | 3210 | 3215 | |
| ccg cta ccg cgg ctc gcg ggc atg gca gcc gcc gaa cgc cgc cgc gcg | | | 9696 |
| Pro Leu Pro Arg Leu Ala Gly Met Ala Ala Ala Glu Arg Arg Arg Ala | | | |
| 3220 | 3225 | 3230 | |
| atg ctg gac ctg gtg ctg gcg gag gcc tcg att gtg ttg gga cac aac | | | 9744 |
| Met Leu Asp Leu Val Leu Ala Glu Ala Ser Ile Val Leu Gly His Asn | | | |
| 3235 | 3240 | 3245 | |
| ggg tct gac cca gtt ggt ccc gac cgg gcg ttc cag gag ctc gga ttt | | | 9792 |
| Gly Ser Asp Pro Val Gly Pro Asp Arg Ala Phe Gln Glu Leu Gly Phe | | | |
| 3250 | 3255 | 3260 | |
| gat tcg ctg atg gcc gtc gaa ctg cgc aac agg ttg ggc gag gca aca | | | 9840 |
| Asp Ser Leu Met Ala Val Glu Leu Arg Asn Arg Leu Gly Glu Ala Thr | | | |
| 3265 | 3270 | 3275 | 3280 |
| gga ttg agt ctg ccg gcc acg ttg atc ttc gat tat ccg agc cca tcc | | | 9888 |
| Gly Leu Ser Leu Pro Ala Thr Leu Ile Phe Asp Tyr Pro Ser Pro Ser | | | |
| 3285 | 3290 | 3295 | |
| gcg ctg gct gag cag ctg gtc ggc gag ctg gtg gga gcg cag ccc gcg | | | 9936 |
| Ala Leu Ala Glu Gln Leu Val Gly Glu Leu Val Gly Ala Gln Pro Ala | | | |
| 3300 | 3305 | 3310 | |
| acc acc gtc gtg gcc ggg gcc gat cca gtg gat gat ccg gtt gtc gtg | | | 9984 |
| Thr Thr Val Val Ala Gly Ala Asp Pro Val Asp Asp Pro Val Val Val | | | |
| 3315 | 3320 | 3325 | |
| gtc gcg atg gga tgc cgg tat ccg ggc gac gtc tgc tcg ccc gag gag | | | 10032 |
| Val Ala Met Gly Cys Arg Tyr Pro Gly Asp Val Cys Ser Pro Glu Glu | | | |
| 3330 | 3335 | 3340 | |
| ctg tgg cag ctg gtt tct gcg gga cgt gat gcg gta tcg acg ttc ccc | | | 10080 |
| Leu Trp Gln Leu Val Ser Ala Gly Arg Asp Ala Val Ser Thr Phe Pro | | | |
| 3345 | 3350 | 3355 | 3360 |
| gtc gat cgg ggt tgg gac tgc aac acg ttg ttc gac ccg gat ccg gat | | | 10128 |
| Val Asp Arg Gly Trp Asp Cys Asn Thr Leu Phe Asp Pro Asp Pro Asp | | | |
| 3365 | 3370 | 3375 | |
| cgg gca ggc agt acc tat gtg cga gaa ggt gcc ttc ctg acc ggt gct | | | 10176 |
| Arg Ala Gly Ser Thr Tyr Val Arg Glu Gly Ala Phe Leu Thr Gly Ala | | | |
| 3380 | 3385 | 3390 | |
| gat cgg ttc gac gcc ggg ttc ttc ggc atc agc cct cgc gag gcg cgc | | | 10224 |

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|-----|------|------|------|-----|------|------|------|------|------|------|------|------|------|-----|------|-------|--|
| Asp | Arg | Phe | Asp | Ala | Gly | Phe | Phe | Gly | Ile | Ser | Pro | Arg | Glu | Ala | Arg | | |
| | | 3395 | | | | | 3400 | | | | | 3405 | | | | | |
| gca | atg | gat | ccg | cag | cag | agg | ttg | ttg | ctc | gaa | gtg | gcg | tgg | gag | gtt | 10272 | |
| Ala | Met | Asp | Pro | Gln | Gln | Arg | Leu | Leu | Leu | Glu | Val | Ala | Trp | Glu | Val | | |
| | 3410 | | | | | 3415 | | | | | 3420 | | | | | | |
| ttc | gaa | cga | gca | gga | atc | gct | ccg | ctg | tcg | ttg | cgg | ggt | agc | agg | acc | 10320 | |
| Phe | Glu | Arg | Ala | Gly | Ile | Ala | Pro | Leu | Ser | Leu | Arg | Gly | Ser | Arg | Thr | | |
| | 3425 | | | | 3430 | | | | | 3435 | | | | | 3440 | | |
| ggt | gtg | ttc | gcg | ggg | acc | aat | ggg | cag | gac | cac | ggt | gcg | aaa | gtg | gct | 10368 | |
| Gly | Val | Phe | Ala | Gly | Thr | Asn | Gly | Gln | Asp | His | Gly | Ala | Lys | Val | Ala | | |
| | | | 3445 | | | | | 3450 | | | | | 3455 | | | | |
| gcc | gcg | ccg | gag | gcg | gcg | ggt | cac | ctc | ctg | acc | gga | aac | gcc | gcg | agt | 10416 | |
| Ala | Ala | Pro | Glu | Ala | Ala | Gly | His | Leu | Leu | Thr | Gly | Asn | Ala | Ala | Ser | | |
| | | 3460 | | | | | | 3465 | | | | 3470 | | | | | |
| gtc | ctg | gcc | ggc | cgg | ctt | tcc | tac | acg | ttc | ggc | ctt | gag | ggg | cct | gcg | 10464 | |
| Val | Leu | Ala | Gly | Arg | Leu | Ser | Tyr | Thr | Phe | Gly | Leu | Glu | Gly | Pro | Ala | | |
| | 3475 | | | | | | 3480 | | | | | 3485 | | | | | |
| gtg | gcg | gtg | gat | acc | gcg | tgt | tcg | tcg | tcg | ttg | gtg | gcg | ttg | cat | ttg | 10512 | |
| Val | Ala | Val | Asp | Thr | Ala | Cys | Ser | Ser | Ser | Leu | Val | Ala | Leu | His | Leu | | |
| | 3490 | | | | | 3495 | | | | 3500 | | | | | | | |
| gcg | tgc | cag | tcg | ctg | cgt | tcg | ggt | gag | tgt | gat | atg | gcg | ttg | gca | ggt | 10560 | |
| Ala | Cys | Gln | Ser | Leu | Arg | Ser | Gly | Glu | Cys | Asp | Met | Ala | Leu | Ala | Gly | | |
| | 3505 | | | | 3510 | | | | 3515 | | | | | | 3520 | | |
| ggt | gtg | acg | gtg | atg | tcg | aca | ccc | ctg | gct | ttc | ctc | gag | ttc | tct | cgt | 10608 | |
| Gly | Val | Thr | Val | Met | Ser | Thr | Pro | Leu | Ala | Phe | Leu | Glu | Phe | Ser | Arg | | |
| | | | 3525 | | | | | 3530 | | | | | 3535 | | | | |
| cag | cgc | ggt | ttg | gcg | cca | gat | ggt | cgg | tgc | aag | tcg | ttt | gcg | gcc | gct | 10656 | |
| Gln | Arg | Gly | Leu | Ala | Pro | Asp | Gly | Arg | Cys | Lys | Ser | Phe | Ala | Ala | Ala | | |
| | | 3540 | | | | | 3545 | | | | | 3550 | | | | | |
| gcg | gat | ggc | acc | ggg | tgg | ggt | gag | ggt | gcc | ggc | ctg | gtg | ttg | ctg | gag | 10704 | |
| Ala | Asp | Gly | Thr | Gly | Trp | Gly | Glu | Gly | Ala | Gly | Leu | Val | Leu | Leu | Glu | | |
| | 3555 | | | | | 3560 | | | | | 3565 | | | | | | |
| cgg | ttg | tcg | gat | gct | cgt | cgg | aat | ggt | cac | cgg | gtg | ttg | gcc | gtg | gtt | 10752 | |
| Arg | Leu | Ser | Asp | Ala | Arg | Arg | Asn | Gly | His | Arg | Val | Leu | Ala | Val | Val | | |
| | 3570 | | | | | 3575 | | | | | 3580 | | | | | | |
| cgc | ggg | tct | gcg | gtg | aat | cag | gat | ggt | gcg | tcg | aat | ggc | ctg | act | gcg | 10800 | |
| Arg | Gly | Ser | Ala | Val | Asn | Gln | Asp | Gly | Ala | Ser | Asn | Gly | Leu | Thr | Ala | | |
| | 3585 | | | | 3590 | | | | 3595 | | | | | | 3600 | | |
| ccg | aat | ggt | ccg | tcg | cag | cag | cgg | gtg | att | cgg | cag | gcc | ctc | gcg | aat | 10848 | |
| Pro | Asn | Gly | Pro | Ser | Gln | Gln | Arg | Val | Ile | Arg | Gln | Ala | Leu | Ala | Asn | | |
| | | | 3605 | | | | | 3610 | | | | 3615 | | | | | |
| gcg | ggg | ctg | tcg | gcg | tcc | gat | gtg | gat | gtc | gtg | gag | gcg | cac | ggg | acc | 10896 | |
| Ala | Gly | Leu | Ser | Ala | Ser | Asp | Val | Asp | Val | Val | Glu | Ala | His | Gly | Thr | | |
| | | 3620 | | | | | 3625 | | | | 3630 | | | | | | |
| ggt | acc | ggg | ctc | ggg | gat | ccg | atc | gag | gcg | cag | gcg | ctg | atc | gcg | aca | 10944 | |
| Gly | Thr | Gly | Leu | Gly | Asp | Pro | Ile | Glu | Ala | Gln | Ala | Leu | Ile | Ala | Thr | | |
| | 3635 | | | | | 3640 | | | | | 3645 | | | | | | |

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| | |
|---|-------|
| tat ggg cag gag cgg gat cct gag cgg gcc ctg tgg ctg ggg tcg atc Tyr Gly Gln Glu Arg Asp Pro Glu Arg Ala Leu Trp Leu Gly Ser Ile 3650 3655 3660 | 10992 |
| aag tcc aac atc ggc cac acg cag gcg gcg gcc ggt gtg gcg ggg gtc Lys Ser Asn Ile Gly His Thr Gln Ala Ala Gly Val Ala Gly Val 3665 3670 3675 3680 | 11040 |
| atc aag atg gtg cag gcc atg cgg cac ggg gag ttg cct gcg acg ttg Ile Lys Met Val Gln Ala Met Arg His Gly Glu Leu Pro Ala Thr Leu 3685 3690 3695 | 11088 |
| cac gtg gac aag ccc act cca cag gtg gac tgg tct gcc ggg gcc gtt His Val Asp Lys Pro Thr Pro Gln Val Asp Trp Ser Ala Gly Ala Val 3700 3705 3710 | 11136 |
| cgg ctc ctc acc ggg aac acg ccc tgg ccc gag agc ggc cgt cct cgt Arg Leu Leu Thr Gly Asn Thr Pro Trp Pro Glu Ser Gly Arg Pro Arg 3715 3720 3725 | 11184 |
| cga gcg ggg gtg tcg tcg ttc ggg atc agc ggc acc aac gca cac ctc Arg Ala Gly Val Ser Ser Phe Gly Ile Ser Gly Thr Asn Ala His Leu 3730 3735 3740 | 11232 |
| atc ctc gaa caa cca ccg tcg gaa cca gcg gag atc gac caa tcg gat Ile Leu Glu Gln Pro Pro Ser Glu Pro Ala Glu Ile Asp Gln Ser Asp 3745 3750 3755 3760 | 11280 |
| cgg cgg gtc act gcg cat cca gcg gtg atc ccg tgg atg ttg tcg gct Arg Arg Val Thr Ala His Pro Ala Val Ile Pro Trp Met Leu Ser Ala 3765 3770 3775 | 11328 |
| agg agt ctc gca gcg ctg cag gcc caa gcg gct gcg ctg cag gcc cgg Arg Ser Leu Ala Ala Leu Gln Ala Gln Ala Ala Leu Gln Ala Arg 3780 3785 3790 | 11376 |
| ctg gac cgg ggt cct ggc gct tct ccg ctg gat ttg ggg tat tca ctc Leu Asp Arg Gly Pro Gly Ala Ser Pro Leu Asp Leu Gly Tyr Ser Leu 3795 3800 3805 | 11424 |
| gcg acc act cgt tct gtg ctg gac gaa cgc gcc gtc gtg tgg ggt gcc Ala Thr Thr Arg Ser Val Leu Asp Glu Arg Ala Val Val Trp Gly Ala 3810 3815 3820 | 11472 |
| gat cgg gag gca ctg ctg tcc agg ctg gca gcg ctc gcc gat ggc cgg Asp Arg Glu Ala Leu Leu Ser Arg Leu Ala Ala Leu Ala Asp Gly Arg 3825 3830 3835 3840 | 11520 |
| acg gcg ccg ggg gtg ata acg ggc tct gcg aat tcc ggt ggc cgc atc Thr Ala Pro Gly Val Ile Thr Gly Ser Ala Asn Ser Gly Gly Arg Ile 3845 3850 3855 | 11568 |
| gga ttc gtt ttt tcc ggt cag ggc agt cag tgg ctg ggg atg gga aag Gly Phe Val Phe Ser Gly Gln Gly Ser Gln Trp Leu Gly Met Gly Lys 3860 3865 3870 | 11616 |
| gcg ttg tgc gcg gct ttc ccg gcg ttc gcg gac gcc ttc gag gaa gcc Ala Leu Cys Ala Ala Phe Pro Ala Phe Ala Asp Ala Phe Glu Glu Ala 3875 3880 3885 | 11664 |
| tgc gac gcg cta agc gca cac ctg ggc gcg gac gtt cgg ggt gtg ctg Cys Asp Ala Leu Ser Ala His Leu Gly Ala Asp Val Arg Gly Val Leu 3890 3895 3900 | 11712 |

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|---|-------|
| ttc ggt gct gat gag cag atg ctc gac cgg acg ctg tgg gcg cag tcg Phe Gly Ala Asp Glu Gln Met Leu Asp Arg Thr Leu Trp Ala Gln Ser 3905 3910 3915 3920 | 11760 |
| ggg atc ttc gcg gtt caa gtc ggc ctc ctg gga ttg ctg agg tcg tgg Gly Ile Phe Ala Val Gln Val Gly Leu Gly Leu Leu Arg Ser Trp 3925 3930 3935 | 11808 |
| ggc gtg cgg ccg gcc gcg gtg ctg ggg cac tcg gtc ggc gag ttg gct Gly Val Arg Pro Ala Ala Val Leu Gly His Ser Val Gly Glu Leu Ala 3940 3945 3950 | 11856 |
| gcg gcg cac gcg gct ggt gtg ttg tcc ttg ccg gac gct gca cgg ttg Ala Ala His Ala Ala Gly Val Leu Ser Leu Pro Asp Ala Ala Arg Leu 3955 3960 3965 | 11904 |
| gtt gcg gct cgg gcc cac ctg atg cag gca ttg ccc acc ggc ggc gca Val Ala Ala Arg Ala His Leu Met Gln Ala Leu Pro Thr Gly Gly Ala 3970 3975 3980 | 11952 |
| atg ctc gcg gtc gcc acc agc gag gcg gcg gtc gga ccg ctg ctt tcc Met Leu Ala Val Ala Thr Ser Glu Ala Ala Val Gly Pro Leu Leu Ser 3985 3990 3995 4000 | 12000 |
| ggg gtg tgc gat cgg gtc agc atc gct gcg atc aac ggc ccc gag tcg Gly Val Cys Asp Arg Val Ser Ile Ala Ala Ile Asn Gly Pro Glu Ser 4005 4010 4015 | 12048 |
| gta gtg ctc tcc ggc gac cgc gat gtg ctc gtg gag ctc gca ggc gaa Val Val Leu Ser Gly Asp Arg Asp Val Leu Val Glu Leu Ala Gly Glu 4020 4025 4030 | 12096 |
| ttc gat gcc cga ggg ctt agg acc aaa tgg ttg cgg gtc tcc cat gct Phe Asp Ala Arg Gly Leu Arg Thr Lys Trp Leu Arg Val Ser His Ala 4035 4040 4045 | 12144 |
| ttc cac tcg cac cgg atg gaa ccg att ctg gac gag tac gcg gaa acc Phe His Ser His Arg Met Glu Pro Ile Leu Asp Glu Tyr Ala Glu Thr 4050 4055 4060 | 12192 |
| gcc agg tgc gtc gag ttc ggt gaa ccg gtg gtg ccg atc gtc tcc gcc Ala Arg Cys Val Glu Phe Gly Glu Pro Val Val Pro Ile Val Ser Ala 4065 4070 4075 4080 | 12240 |
| gcg acc ggt gcg ctg gac acc acc gga ctg atg tgc gcg gcc gac tac Ala Thr Gly Ala Leu Asp Thr Thr Gly Leu Met Cys Ala Ala Asp Tyr 4085 4090 4095 | 12288 |
| tgg acg cgc caa gtg cgt gat cct gtc cgc ttc gga gac ggt gtc cgg Trp Thr Arg Gln Val Arg Asp Pro Val Arg Phe Gly Asp Gly Val Arg 4100 4105 4110 | 12336 |
| gcg ctc gtc ggc caa ggc gtg gac acg atc gtc gag ttc ggc ccg gac Ala Leu Val Gly Gln Gly Val Asp Thr Ile Val Glu Phe Gly Pro Asp 4115 4120 4125 | 12384 |
| ggg gcg ttg tcg gcc ctg gtc gag cag tgc ttg gcc ggg tcc gac cag Gly Ala Leu Ser Ala Leu Val Glu Gln Cys Leu Ala Gly Ser Asp Gln 4130 4135 4140 | 12432 |
| gct ggg agg gtg gcg gcg atc ccg ctg atg cgc agg gac cgc gat gag Ala Gly Arg Val Ala Ala Ile Pro Leu Met Arg Arg Asp Arg Asp Glu 4145 4150 4155 | 12480 |

| 4145 | 4150 | LeA33955-US 4155 | 4160 | | |
|--|------|---------------------|------|-------|-------|
| gtc gag acc gcg gtg gcg gcc ctg gcg cac gtg cac gtc cgc ggt ggt Val Glu Thr Ala Val Ala Ala Leu Ala His Val His Val Arg Gly Gly | 4165 | 4170 | 4175 | 12528 | |
| gcg gtg gac tgg tcg gct tgc ttc gcc ggc acc ggc gcc cgc acc gtc Ala Val Asp Trp Ser Ala Cys Phe Ala Gly Thr Gly Ala Arg Thr Val | 4180 | 4185 | 4190 | 12576 | |
| gag ttg ccc acc tac gcc ttc caa cgc cag cgg tac tgg ctg gcc ggg Glu Leu Pro Thr Tyr Ala Phe Gln Arg Gln Arg Tyr Trp Leu Ala Gly | 4195 | 4200 | 4205 | 12624 | |
| caa gcg gac ggg cgc ggc ggc gat gtg gtt gcc gac ccg gtc gac gcg Gln Ala Asp Gly Arg Gly Gly Asp Val Val Ala Asp Pro Val Asp Ala | 4210 | 4215 | 4220 | 12672 | |
| cgc ttc tgg gag ttg gtc gag cgc gcc gat ccg gaa ccg ttg gtg gat Arg Phe Trp Glu Leu Val Glu Arg Ala Asp Pro Glu Pro Leu Val Asp | 4225 | 4230 | 4235 | 12720 | |
| gaa ctc tgc atc gac cgg gac cag ccc ttc cgg gag gtg ctg ccc gtt Glu Leu Cys Ile Asp Arg Asp Gln Pro Phe Arg Glu Val Leu Pro Val | 4245 | 4250 | 4255 | 12768 | |
| ctg gct tcc tgg cgc gag aaa caa cgc cag gag gcc ctc gcg gat tcc Leu Ala Ser Trp Arg Glu Lys Gln Arg Gln Glu Ala Leu Ala Asp Ser | 4260 | 4265 | 4270 | 12816 | |
| tgg cgc tac cag gtg cgc tgg agg tcc gtc gag gtg ccg tcc gca gcc Trp Arg Tyr Gln Val Arg Trp Arg Ser Val Glu Val Pro Ser Ala Ala | 4275 | 4280 | 4285 | 12864 | |
| gcc ctc cgg ggc gtg tgg ctg gtg gtg ctt cca gct gac gtg ccc cga Ala Leu Arg Gly Val Trp Leu Val Val Leu Pro Ala Asp Val Pro Arg | 4290 | 4295 | 4300 | 12912 | |
| gat caa ccg gcg gtc gtc atc gac gcg ctg atc gcg cgc ggc gcc gag Asp Gln Pro Ala Val Val Ile Asp Ala Leu Ile Ala Arg Gly Ala Glu | 4305 | 4310 | 4315 | 12960 | |
| gtc gcg gtc ctg gaa ttg acc gag cag gac ctc caa cgc agt gcg ctt Val Ala Val Leu Glu Leu Thr Glu Gln Asp Leu Gln Arg Ser Ala Leu | 4325 | 4330 | 4335 | 13008 | |
| gtg gac aag gtg cgc gcc gtc att gcg gac cgc acc gag gtg acg ggt Val Asp Lys Val Arg Ala Val Ile Ala Asp Arg Thr Glu Val Thr Gly | 4340 | 4345 | 4350 | 13056 | |
| gtg ttg tct ctg ttg gcg atg gac ggc atg ccc tgc gcg gcg cat ccg Val Leu Ser Leu Leu Ala Met Asp Gly Met Pro Cys Ala Ala His Pro | 4355 | 4360 | 4365 | 13104 | |
| cac ctg tcc cgt ggt gtc gcc gct acc gtg atc ctg acg cag gtg ttg His Leu Ser Arg Gly Val Ala Ala Thr Val Ile Leu Thr Gln Val Leu | 4370 | 4375 | 4380 | 13152 | |
| ggc gat gcg ggt gtt tcc gcc ccg ctg tgg ctg gcc acg acc ggt ggc Gly Asp Ala Gly Val Ser Ala Pro Leu Trp Leu Ala Thr Thr Gly Gly | 4385 | 4390 | 4395 | 4400 | 13200 |
| gtc gag gcc ggg acc gag gac ggt ccg gcc gat ccg gac cac ggc ttg | | | | 13248 | |

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| | | | | | | | | | | | | | | | | |
|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-------|
| Val | Glu | Ala | Gly | Thr | Glu | Asp | Gly | Pro | Ala | Asp | Pro | Asp | His | Gly | Leu | |
| | | | 4405 | | | | | | 4410 | | | | | 4415 | | |
| atc | tgg | ggg | ctc | ggc | agg | gtc | gtc | ggc | ctt | gaa | cat | ccg | cag | tgg | tgg | 13296 |
| Ile | Trp | Gly | Leu | Gly | Arg | Val | Val | Gly | Leu | Glu | His | Pro | Gln | Trp | Trp | |
| | | | 4420 | | | | | 4425 | | | | | 4430 | | | |
| ggt | ggc | ctg | atc | gac | ctt | ccg | gag | aca | ctg | gac | gag | acg | tcc | cgg | aac | 13344 |
| Gly | Gly | Leu | Ile | Asp | Leu | Pro | Glu | Thr | Leu | Asp | Glu | Thr | Ser | Arg | Asn | |
| | | 4435 | | | | | 4440 | | | | | 4445 | | | | |
| ggg | ttg | gtg | gcc | gca | ctc | gcc | ggg | acg | gcg | gcc | gaa | gat | cag | ctc | gcc | 13392 |
| Gly | Leu | Val | Ala | Ala | Leu | Ala | Gly | Thr | Ala | Ala | Glu | Asp | Gln | Leu | Ala | |
| | 4450 | | | | | 4455 | | | | | 4460 | | | | | |
| gtg | cgt | tca | tcc | ggg | ttg | ttc | gtt | cgc | aga | gtg | gtg | cgc | gca | gcg | cgg | 13440 |
| Val | Arg | Ser | Ser | Gly | Leu | Phe | Val | Arg | Arg | Val | Val | Arg | Ala | Ala | Arg | |
| 4465 | | | | | 4470 | | | | | 4475 | | | | | 4480 | |
| aac | ccc | cgg | tca | gag | aca | tgg | cgt | agc | cgg | gga | acg | gtc | ctc | atc | acg | 13488 |
| Asn | Pro | Arg | Ser | Glu | Thr | Trp | Arg | Ser | Arg | Gly | Thr | Val | Leu | Ile | Thr | |
| | | | | 4485 | | | | | 4490 | | | | | 4495 | | |
| ggc | gga | aca | ggc | gcg | ctc | ggt | gcc | gag | gtc | gca | cga | tgg | ctg | gcc | cgg | 13536 |
| Gly | Gly | Thr | Gly | Ala | Leu | Gly | Ala | Glu | Val | Ala | Arg | Trp | Leu | Ala | Arg | |
| | | | 4500 | | | | | 4505 | | | | | 4510 | | | |
| cgg | gga | gct | gag | cac | ctg | gtg | ttg | atc | agt | cgc | cgc | ggc | ccg | gaa | gct | 13584 |
| Arg | Gly | Ala | Glu | His | Leu | Val | Leu | Ile | Ser | Arg | Arg | Gly | Pro | Glu | Ala | |
| | 4515 | | | | | | 4520 | | | | | 4525 | | | | |
| ccc | ggc | gca | gcg | gac | cta | ggg | gcc | gag | ctg | act | gaa | ctc | ggc | gtg | aaa | 13632 |
| Pro | Gly | Ala | Ala | Asp | Leu | Gly | Ala | Glu | Leu | Thr | Glu | Leu | Gly | Val | Lys | |
| | 4530 | | | | | 4535 | | | | | 4540 | | | | | |
| gtc | aca | gtc | ttg | gcc | tgc | gat | gtg | acg | gac | cgc | gac | gag | ctg | gcg | gcg | 13680 |
| Val | Thr | Val | Leu | Ala | Cys | Asp | Val | Thr | Asp | Arg | Asp | Glu | Leu | Ala | Ala | |
| 4545 | | | | | 4550 | | | | | 4555 | | | | | 4560 | |
| gtg | ctg | gcg | gcc | gtt | ccc | acg | gag | tat | ccg | ctg | tcg | gcg | gtc | gtg | cac | 13728 |
| Val | Leu | Ala | Ala | Val | Pro | Thr | Glu | Tyr | Pro | Leu | Ser | Ala | Val | Val | His | |
| | | | | 4565 | | | | | 4570 | | | | | 4575 | | |
| acc | gcc | ggc | gtc | ggg | acg | cct | gcg | aac | ctg | gcc | gag | acg | acc | ttg | gcg | 13776 |
| Thr | Ala | Gly | Val | Gly | Thr | Pro | Ala | Asn | Leu | Ala | Glu | Thr | Thr | Leu | Ala | |
| | | | 4580 | | | | | 4585 | | | | | 4590 | | | |
| cag | ttc | gcc | gac | gtg | ttg | tcg | gcc | aag | gtc | gtc | ggc | gcg | gcg | aac | ctg | 13824 |
| Gln | Phe | Ala | Asp | Val | Leu | Ser | Ala | Lys | Val | Val | Gly | Ala | Ala | Asn | Leu | |
| | | 4595 | | | | | 4600 | | | | | 4605 | | | | |
| gac | cgg | ctg | ctt | ggc | ggg | caa | ccg | ttg | gac | gcc | ttc | gtg | ctg | ttc | tcc | 13872 |
| Asp | Arg | Leu | Leu | Gly | Gly | Gln | Pro | Leu | Asp | Ala | Phe | Val | Leu | Phe | Ser | |
| | 4610 | | | | | 4615 | | | | | 4620 | | | | | |
| tcg | atc | tcg | gga | gtt | tgg | gga | gcc | ggc | ggc | caa | gga | gcc | tat | tcg | gcc | 13920 |
| Ser | Ile | Ser | Gly | Val | Trp | Gly | Ala | Gly | Gly | Gln | Gly | Ala | Tyr | Ser | Ala | |
| 4625 | | | | | 4630 | | | | | 4635 | | | | | 4640 | |
| gcc | aat | gcg | tat | ctc | gat | gcc | ctt | gcc | gag | cgc | cga | cgg | gct | tgc | ggg | 13968 |
| Ala | Asn | Ala | Tyr | Leu | Asp | Ala | Leu | Ala | Glu | Arg | Arg | Arg | Ala | Cys | Gly | |
| | | | | 4645 | | | | | 4650 | | | | | 4655 | | |

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| | |
|---|-------|
| cgg ccg gcg acg tgc atc gcc tgg ggt ccg tgg gcg ggt gcg ggc atg Arg Pro Ala Thr Cys Ile Ala Trp Gly Pro Trp Ala Gly Ala Gly Met 4660 4665 4670 | 14016 |
| gcc gtt cag gaa ggt aac gag gcg cat ctc cgc cga agg ggc ctg gta Ala Val Gln Glu Gly Asn Glu Ala His Leu Arg Arg Arg Gly Leu Val 4675 4680 4685 | 14064 |
| ccg atg gaa ccg cag tcg gcc ctc ttc gcg ctg caa cag gcc ctg tcc Pro Met Glu Pro Gln Ser Ala Leu Phe Ala Leu Gln Gln Ala Leu Ser 4690 4695 4700 | 14112 |
| caa cga gaa acc gcc atc acc gtc gca gat gtg gac tgg gag cga ttc Gln Arg Glu Thr Ala Ile Thr Val Ala Asp Val Asp Trp Glu Arg Phe 4705 4710 4715 4720 | 14160 |
| gcc gcc tct ttc acc gcg gcc cgc ccg cga cca ctg ttg gaa gag atc Ala Ala Ser Phe Thr Ala Ala Arg Pro Arg Pro Leu Leu Glu Glu Ile 4725 4730 4735 | 14208 |
| gtg gat cta cgg ccc gac acc gag acc gag gag aag cac ggt gcc ggc Val Asp Leu Arg Pro Asp Thr Glu Thr Glu Glu Lys His Gly Ala Gly 4740 4745 4750 | 14256 |
| gag ctg ggg cag cag ctg gcc gca ctg ccg ccc gct gag cgc gga cac Glu Leu Gly Gln Gln Leu Ala Ala Leu Pro Pro Ala Glu Arg Gly His 4755 4760 4765 | 14304 |
| ctg ctg ctg gag gtg gtg ctg gcg gaa acc gcc agc acc ctg ggg cac Leu Leu Leu Glu Val Val Leu Ala Glu Thr Ala Ser Thr Leu Gly His 4770 4775 4780 | 14352 |
| gat tcg gcg gag gct gtg caa ccc gat ccg acc ttc gcc gaa ctg ggc Asp Ser Ala Glu Ala Val Gln Pro Asp Arg Thr Phe Ala Glu Leu Gly 4785 4790 4795 4800 | 14400 |
| ttc gat tcg ctg acc gcg gta gag ctg cgc aac agg ttg aac gcg gtg Phe Asp Ser Leu Thr Ala Val Glu Leu Arg Asn Arg Leu Asn Ala Val 4805 4810 4815 | 14448 |
| acc ggg ctt cgc ctg ccg ccg acg ctg gtt ttc gac cac ccg acg ccg Thr Gly Leu Arg Leu Pro Pro Thr Leu Val Phe Asp His Pro Thr Pro 4820 4825 4830 | 14496 |
| ctg gcg ttg tcc gaa cag ttg gtt ccg gcc ctg gtc gcg gag ccg gac Leu Ala Leu Ser Glu Gln Leu Val Pro Ala Leu Val Ala Glu Pro Asp 4835 4840 4845 | 14544 |
| aac ggc atc gaa tcg ctg ctc gcc gag ctc gac agg ctg gat acc acg Asn Gly Ile Glu Ser Leu Leu Ala Glu Leu Asp Arg Leu Asp Thr Thr 4850 4855 4860 | 14592 |
| ttg gcg caa ggg cct tcg atc cca ctg gaa gac cag gcc aag gtg gcg Leu Ala Gln Gly Pro Ser Ile Pro Leu Glu Asp Gln Ala Lys Val Ala 4865 4870 4875 4880 | 14640 |
| gag cgc ttg cac gca ctc ctc gcc aag tgg gac ggg gcg cgt gac ggc Glu Arg Leu His Ala Leu Leu Ala Lys Trp Asp Gly Ala Arg Asp Gly 4885 4890 4895 | 14688 |
| acg gcc aga gcg acg tca ccc caa tcg ctg acg gcg gcc acg gac gac Thr Ala Arg Ala Thr Ser Pro Gln Ser Leu Thr Ala Ala Thr Asp Asp 4900 4905 4910 | 14736 |

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gaa atc ttc gac ctc atc gac cgg aag ttc cgg cgc tga
 Glu Ile Phe Asp Leu Ile Asp Arg Lys Phe Arg Arg
 4915 4920

14775

<210> 48
 <211> 4924
 <212> PRT
 <213> Saccharopolyspora spinosa

<400> 48
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 1 5 10 15
 Asp Leu His Gln Thr Arg Gln Arg Leu Leu Ala Ala Glu Ser Arg Ser
 20 25 30
 Gln Glu Pro Ile Ala Ile Val Ser Ala Ser Cys Arg Leu Pro Gly Gly
 35 40 45
 Val Asp Ser Pro Glu Ala Leu Trp Gln Leu Val Arg Thr Gly Thr Asp
 50 55 60
 Ala Ile Ser Glu Phe Pro Ala Asp Arg Gly Trp Asp Leu Gly Arg Leu
 65 70 75 80
 Tyr Asp Pro Asp Pro Asn His Gln Gly Thr Ser Tyr Thr Arg Ala Gly
 85 90 95
 Gly Phe Leu Ala Gly Ala Gly Asp Phe Asp Pro Ala Met Phe Gly Ile
 100 105 110
 Ser Pro Arg Glu Ala Leu Ala Met Asp Pro Gln Gln Arg Leu Leu Leu
 115 120 125
 Glu Leu Ser Trp Glu Ala Leu Glu Arg Ala Gly Ile Asp Pro Thr Ser
 130 135 140
 Leu Arg Gly Ser Lys Thr Gly Val Phe Gly Gly Val Thr Pro Gln Glu
 145 150 155 160
 Tyr Gly Pro Ser Leu Gln Glu Met Ser Arg Asn Ala Gly Gly Phe Gly
 165 170 175
 Leu Thr Gly Arg Met Val Ser Val Ala Ser Gly Arg Val Ala Tyr Ser
 180 185 190
 Phe Gly Phe Glu Gly Pro Ala Val Thr Val Asp Thr Ala Cys Ser Ser
 195 200 205
 Ser Leu Val Ala Leu His Leu Ala Cys Gln Ser Leu Arg Ser Gly Glu
 210 215 220
 Cys Asp Leu Ala Leu Ala Gly Gly Val Thr Val Met Ala Thr Pro Ala
 225 230 235 240
 Thr Phe Val Glu Phe Ser Arg Gln Arg Gly Leu Ala Pro Asp Gly Arg
 245 250 255
 Cys Lys Ser Phe Ala Ala Ala Ala Asp Gly Thr Gly Trp Gly Glu Gly
 260 265 270

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| | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Ala | Gly | Leu | Val | Leu | Leu | Glu | Arg | Leu | Ser | Asp | Ala | Arg | Arg | Asn | Gly |
| | | 275 | | | | | 280 | | | | | 285 | | | |
| His | Glu | Val | Leu | Ala | Val | Val | Arg | Gly | Ser | Ala | Val | Asn | Gln | Asp | Gly |
| | 290 | | | | | 295 | | | | | 300 | | | | |
| Ala | Ser | Asn | Gly | Leu | Thr | Ala | Pro | Asn | Gly | Pro | Ser | Gln | Gln | Arg | Val |
| 305 | | | | | 310 | | | | | 315 | | | | | 320 |
| Ile | Thr | Gln | Ala | Leu | Ala | Ser | Ala | Gly | Leu | Ser | Val | Ser | Asp | Val | Asp |
| | | | | 325 | | | | | 330 | | | | | 335 | |
| Ala | Val | Glu | Ala | His | Gly | Thr | Gly | Thr | Thr | Leu | Gly | Asp | Pro | Ile | Glu |
| | | | 340 | | | | 345 | | | | | | 350 | | |
| Ala | Gln | Ala | Leu | Ile | Ala | Thr | Tyr | Gly | Gln | Gly | Arg | Glu | Lys | Asp | Arg |
| | | 355 | | | | | 360 | | | | | 365 | | | |
| Pro | Leu | Trp | Leu | Gly | Ser | Val | Lys | Ser | Asn | Ile | Gly | His | Thr | Gln | Ala |
| | 370 | | | | | 375 | | | | | 380 | | | | |
| Ala | Ala | Gly | Val | Ala | Gly | Val | Ile | Lys | Met | Val | Leu | Ala | Met | Arg | His |
| 385 | | | | | 390 | | | | | 395 | | | | | 400 |
| Gly | Gln | Leu | Pro | Ala | Thr | Leu | His | Val | Asp | Glu | Pro | Thr | Ser | Ala | Val |
| | | | | 405 | | | | | 410 | | | | | 415 | |
| Asp | Trp | Ser | Ala | Gly | Ser | Val | Arg | Leu | Leu | Thr | Glu | Asn | Thr | Pro | Trp |
| | | | 420 | | | | | 425 | | | | | 430 | | |
| Pro | Asp | Ser | Gly | Arg | Pro | Cys | Arg | Val | Gly | Val | Ser | Ser | Phe | Gly | Ile |
| | | 435 | | | | | 440 | | | | | 445 | | | |
| Ser | Gly | Thr | Asn | Ala | His | Val | Ile | Leu | Glu | Gln | Ser | Pro | Val | Glu | Gln |
| | 450 | | | | | 455 | | | | | 460 | | | | |
| Gly | Glu | Pro | Ala | Gly | Pro | Val | Glu | Gly | Glu | Arg | Glu | Pro | Asp | Val | Ala |
| 465 | | | | | 470 | | | | | 475 | | | | | 480 |
| Val | Pro | Val | Val | Pro | Trp | Val | Leu | Ser | Gly | Lys | Thr | Pro | Glu | Ala | Ala |
| | | | | 485 | | | | | 490 | | | | | 495 | |
| Arg | Ala | Gln | Ala | Glu | Arg | Val | His | Ser | His | Ile | Glu | Asp | Arg | Pro | Gly |
| | | | 500 | | | | | 505 | | | | | 510 | | |
| Leu | Ser | Pro | Val | Asp | Val | Ala | Tyr | Ser | Leu | Gly | Met | Thr | Arg | Ala | Ala |
| | | 515 | | | | | 520 | | | | | 525 | | | |
| Leu | Asp | Glu | Arg | Ala | Val | Val | Leu | Gly | Ser | Asp | Arg | Ala | Ala | Leu | Leu |
| | 530 | | | | | 535 | | | | | 540 | | | | |
| Thr | Gly | Leu | Arg | Ala | Phe | Ala | Asp | Gly | Cys | Asp | Ala | Pro | Glu | Val | Val |
| 545 | | | | | 550 | | | | | 555 | | | | | 560 |
| Ser | Gly | Ser | Val | Gly | Leu | Gly | Gly | Arg | Val | Gly | Phe | Val | Phe | Ser | Gly |
| | | | | 565 | | | | | 570 | | | | | 575 | |
| Gln | Gly | Gly | Gln | Trp | Pro | Gly | Met | Gly | Arg | Gly | Leu | Tyr | Ser | Val | Phe |
| | | | 580 | | | | | 585 | | | | | 590 | | |
| Pro | Val | Phe | Ala | Asp | Ala | Phe | Asp | Glu | Ala | Cys | Ala | Glu | Leu | Asp | Ala |
| | | 595 | | | | | 600 | | | | | 605 | | | |

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| | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| His | Leu | Gly | Gln | Glu | Leu | Arg | Val | Arg | Asp | Val | Val | Phe | Gly | Ser | Gln |
| 610 | | | | | | 615 | | | | | 620 | | | | |
| Ala | Trp | Leu | Leu | Asp | Arg | Thr | Val | Trp | Ala | Gln | Ser | Gly | Leu | Phe | Ala |
| 625 | | | | | 630 | | | | | 635 | | | | | 640 |
| Leu | Gln | Ile | Gly | Leu | Leu | Arg | Leu | Leu | Gly | Ser | Trp | Gly | Val | Arg | Pro |
| | | | | 645 | | | | | 650 | | | | | 655 | |
| Asp | Val | Val | Leu | Gly | His | Ser | Val | Gly | Glu | Leu | Ala | Ala | Val | His | Ala |
| | | | 660 | | | | | 665 | | | | | 670 | | |
| Ala | Gly | Val | Leu | Ser | Leu | Ser | Glu | Ala | Ala | Arg | Leu | Val | Ala | Gly | Arg |
| | | 675 | | | | | 680 | | | | | 685 | | | |
| Ala | Arg | Leu | Met | Gln | Ala | Leu | Pro | Ser | Gly | Gly | Ala | Met | Leu | Ala | Val |
| | 690 | | | | | 695 | | | | | 700 | | | | |
| Ala | Thr | Gly | Glu | Phe | Gln | Val | Asp | Pro | Leu | Leu | Asp | Gly | Val | Arg | Asp |
| 705 | | | | | 710 | | | | | 715 | | | | | 720 |
| Arg | Ile | Gly | Ile | Ala | Ala | Val | Asn | Gly | Pro | Glu | Ser | Val | Val | Leu | Ser |
| | | | | 725 | | | | | 730 | | | | | 735 | |
| Gly | Asp | Arg | Glu | Leu | Leu | Thr | Glu | Ile | Ala | Asp | Arg | Leu | His | Asp | Gln |
| | | | 740 | | | | | 745 | | | | | 750 | | |
| Gly | Cys | Arg | Thr | Arg | Trp | Leu | Arg | Val | Ser | His | Ala | Phe | His | Ser | Pro |
| | | 755 | | | | | 760 | | | | | 765 | | | |
| His | Met | Glu | Pro | Met | Leu | Glu | Glu | Phe | Ala | Gln | Ile | Ser | Arg | Gly | Arg |
| | 770 | | | | | 775 | | | | | 780 | | | | |
| Glu | Tyr | His | Ala | Pro | Glu | Leu | Pro | Ile | Ile | Ser | Thr | Leu | Ile | Gly | Glu |
| 785 | | | | | 790 | | | | | 795 | | | | | 800 |
| Leu | Asp | Gly | Gly | Arg | Val | Met | Gly | Thr | Pro | Glu | Tyr | Trp | Val | Arg | Gln |
| | | | | 805 | | | | | 810 | | | | | 815 | |
| Val | Arg | Glu | Pro | Val | Arg | Phe | Ala | Glu | Gly | Val | Gln | Ala | Leu | Val | Gly |
| | | | 820 | | | | | 825 | | | | | 830 | | |
| Gln | Gly | Val | Gly | Thr | Ile | Val | Glu | Leu | Gly | Pro | Asp | Gly | Ala | Leu | Ser |
| | | 835 | | | | | 840 | | | | | 845 | | | |
| Thr | Leu | Val | Glu | Glu | Cys | Val | Ala | Glu | Ser | Gly | Arg | Val | Ala | Gly | Ile |
| | 850 | | | | | 855 | | | | | 860 | | | | |
| Pro | Leu | Met | Arg | Lys | Asp | Arg | Asp | Glu | Ala | Arg | Thr | Val | Leu | Ala | Ala |
| 865 | | | | | 870 | | | | | 875 | | | | | 880 |
| Leu | Ala | Gln | Ile | His | Thr | Arg | Gly | Gly | Glu | Val | Asp | Trp | Arg | Ser | Phe |
| | | | | 885 | | | | | 890 | | | | | 895 | |
| Phe | Ala | Gly | Thr | Gly | Ala | Lys | Gln | Val | Asp | Leu | Pro | Thr | Tyr | Ala | Phe |
| | | | 900 | | | | | 905 | | | | | 910 | | |
| Gln | Arg | Gln | Arg | Tyr | Trp | Leu | Ala | Ser | Thr | Gly | Arg | Ala | Gly | Asp | Val |
| | | 915 | | | | | 920 | | | | | 925 | | | |
| Thr | Ala | Ala | Gly | Leu | Ala | Glu | Ala | Asp | His | Pro | Leu | Leu | Gly | Ala | Val |
| | 930 | | | | | 935 | | | | | 940 | | | | |

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Val Ala Leu Ala Asp Gly Glu Gly Val Val Leu Thr Gly Arg Leu Thr
 945 950 955 960
 Ala Gly Ser His Pro Trp Leu Ser Asp His Arg Val Leu Gly Glu Ile
 965 970 975
 Val Val Pro Gly Thr Ala Ile Val Glu Leu Val Trp His Val Gly Glu
 980 985 990
 Arg Leu Gly Cys Gly Arg Val Glu Glu Leu Ala Leu Glu Ala Pro Leu
 995 1000 1005
 Ile Leu Pro Asp His Gly Ala Val Gln Val Gln Val Leu Val Gly Pro
 1010 1015 1020
 Pro Gly Glu Ser Gly Ala Arg Ser Val Ala Leu Tyr Ser Cys Pro Gly
 1025 1030 1035 1040
 Glu Ala Ile Glu Pro Glu Trp Lys Lys His Ala Thr Gly Val Leu Leu
 1045 1050 1055
 Pro Pro Val Ala Ala Glu Asn His Glu Leu Thr Ala Trp Pro Pro Glu
 1060 1065 1070
 Asn Ala Thr Glu Ile Asp Ala Asp Gly Val Tyr Ala Phe Leu Glu Gly
 1075 1080 1085
 His Gly Phe Ala Tyr Gly Pro Ala Phe Arg Cys Leu Arg Gly Ala Trp
 1090 1095 1100
 Arg Arg Gly Gly Glu Val Phe Ala Glu Val Ala Leu Pro Asp Asp Met
 1105 1110 1115 1120
 Gln Ala Gly Val Asp Arg Phe Gly Val His Pro Ala Leu Leu Asp Ala
 1125 1130 1135
 Val Leu His Ala Ala Ala Glu Thr Ser Val Val Gln Ser Glu Ala
 1140 1145 1150
 Arg Val Pro Phe Ser Trp Arg Gly Val Glu Leu Arg Ala Thr Glu Ser
 1155 1160 1165
 Ala Val Val Arg Ala Arg Leu Ser Leu Thr Ser Asp Asp Glu Leu Ser
 1170 1175 1180
 Leu Val Ala Val Asp Pro Ala Gly Arg Phe Val Ala Thr Val Asp Ser
 1185 1190 1195 1200
 Leu Val Thr Arg Pro Ile Ser Arg Gln Gln Val Arg Ser Gly Ala Ile
 1205 1210 1215
 Gly Asp Cys Leu Phe Glu Val Glu Trp His Arg Lys Ala Leu Leu Gly
 1220 1225 1230
 Thr Thr Ala Gly Asp Asp Leu Ala Ile Val Gly Asp Gly Pro Ser Trp
 1235 1240 1245
 Pro Glu Ser Val Arg Ala Thr Ala Arg Phe Ala Thr Leu Asp Glu Phe
 1250 1255 1260
 Arg Ala Ala Val Asp Ser Asp Val Pro Ala Pro Gly Ser Val Leu Val
 1265 1270 1275 1280

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Ala Ala Met Ser Ala Glu Glu Val Glu Gly Gly Ser Leu Pro Ser Arg
1285 1290 1295

Ala Gln Glu Ser Thr Ser Asp Leu Leu Ala Leu Val Gln Ser Trp Leu
1300 1305 1310

Ala Asp Glu Arg Phe Ala Glu Ser Gln Leu Val Val Val Thr Arg Ala
1315 1320 1325

Ala Val Ser Ala Asp Ser Asp Ser Asp Val Ala Asp Leu Val Gly Ala
1330 1335 1340

Ser Ser Trp Gly Leu Leu Ser Ser Ala Gln Ser Glu Asn Pro Gly Arg
345 1350 1355 1360

Phe Val Leu Val Asp Val Asp Gly Thr Pro Glu Ser Trp Gln Ala Leu
1365 1370 1375

Pro Ala Ala Val Arg Ala Gly Glu Pro Gln Leu Ala Leu Arg Arg Gly
1380 1385 1390

Val Ala Leu Val Pro Arg Leu Ala Arg Leu Thr Val Arg Glu Glu Gly
1395 1400 1405

Ser Ser Pro Gln Leu Asp Thr Asp Gly Thr Val Leu Ile Thr Gly Gly
1410 1415 1420

Thr Gly Ala Leu Gly Gly Val Val Ala Arg His Leu Val Glu Glu His
425 1430 1435 1440

Gly Ile Arg Arg Leu Val Leu Ala Gly Arg Arg Gly Trp Asn Ala Pro
1445 1450 1455

Gly Val His Glu Leu Val Asp Glu Leu Ala Arg Ala Gly Ala Val Val
1460 1465 1470

Glu Val Val Ala Cys Asp Val Ala Asp Arg Thr Asp Leu Glu His Val
1475 1480 1485

Leu Ala Ala Ile Pro Val Asp Trp Pro Leu Arg Gly Ile Val His Thr
1490 1495 1500

Ala Gly Val Leu Ala Asp Gly Val Ile Gly Ser Leu Ser Ala Ala Asp
505 1510 1515 1520

Val Gly Thr Val Phe Ala Pro Lys Val Thr Gly Ala Trp His Leu His
1525 1530 1535

Glu Leu Thr Arg Asp Leu Asp Leu Ser Phe Phe Val Leu Phe Ser Ser
1540 1545 1550

Phe Ser Gly Ile Ala Gly Ala Ala Gly Gln Ala Asn Tyr Ala Ala Ala
1555 1560 1565

Asn Thr Phe Leu Asp Ala Leu Ala Arg Tyr Arg Arg Ala Arg Gly Leu
1570 1575 1580

Pro Gly Leu Ser Leu Ala Trp Gly Leu Trp Ala Gln Pro Ser Gly Met
585 1590 1595 1600

Thr Ser Gly Leu Asp Ala Ala Ser Val Glu Arg Leu Ala Arg Thr Gly
1605 1610 1615

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Ile Ala Glu Leu Ser Thr Glu Asp Gly Leu Arg Leu Phe Asp Ala Ala
1620 1625 1630

Phe Ala Lys Asp Arg Ala Cys Val Val Ala Ala Arg Leu Asp Arg Ala
1635 1640 1645

Leu Leu Val Gly Asn Gly Arg Ser His Ala Ile Pro Ala Leu Leu Ser
1650 1655 1660

Ala Leu Val Pro Val Arg Gly Gly Val Ala Arg Lys Thr Ala Asn Ser
665 1670 1675 1680

Gln Ala Ala Asp Glu Asp Ala Leu Leu Gly Leu Val Arg Glu His Val
1685 1690 1695

Ser Ala Val Leu Gly Tyr Ser Gly Ala Val Glu Val Gly Gly Asp Arg
1700 1705 1710

Ala Phe Arg Asp Leu Gly Phe Asp Ser Leu Ser Gly Val Glu Leu Arg
1715 1720 1725

Asn Arg Leu Ala Gly Val Leu Gly Val Arg Leu Pro Ala Thr Ala Val
1730 1735 1740

Phe Asp Tyr Pro Thr Pro Arg Ala Leu Ala Arg Phe Leu His Gln Glu
745 1750 1755 1760

Leu Ala Gly Glu Val Ala Ser Thr Ser Thr Pro Val Thr Arg Ala Ala
1765 1770 1775

Ser Ala Glu Glu Asp Leu Val Ala Ile Val Gly Met Gly Cys Arg Phe
1780 1785 1790

Pro Gly Gly Val Ser Ser Pro Glu Glu Leu Trp Arg Leu Val Ala Gly
1795 1800 1805

Gly Val Asp Ala Val Ala Gly Phe Pro Asp Asp Arg Gly Trp Asp Leu
1810 1815 1820

Ala Ala Leu Tyr Asp Pro Asp Pro Asp Arg Leu Gly Thr Ser Tyr Val
825 1830 1835 1840

Cys Glu Gly Gly Phe Leu Arg Asp Ala Ala Glu Phe Asp Ala Asp Met
1845 1850 1855

Phe Gly Ile Ser Pro Arg Glu Ala Leu Ala Met Asp Pro Gln Gln Arg
1860 1865 1870

Leu Leu Leu Glu Val Ala Trp Glu Thr Leu Glu Arg Ala Gly Ile Asp
1875 1880 1885

Pro Phe Ser Leu His Gly Ser Arg Thr Gly Val Phe Ala Gly Leu Met
1890 1895 1900

Tyr His Asp Tyr Gly Ala Arg Phe Ile Thr Arg Ala Pro Glu Gly Phe
905 1910 1915 1920

Glu Gly His Leu Gly Thr Gly Asn Ala Gly Ser Val Leu Ser Gly Arg
1925 1930 1935

Val Ala Tyr Ser Phe Gly Phe Glu Gly Pro Ala Val Thr Val Asp Thr
1940 1945 1950

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Ala Cys Ser Ser Ser Leu Val Ala Leu His Leu Ala Gly Gln Ala Leu
1955 1960 1965
Arg Ala Gly Glu Cys Glu Phe Ala Leu Ala Gly Gly Val Thr Val Met
1970 1975 1980
Ser Thr Pro Thr Thr Phe Val Glu Phe Ser Arg Gln Arg Gly Leu Ala
985 1990 1995 2000
Pro Asp Gly Arg Cys Lys Ser Phe Ala Ala Ala Asp Gly Thr Gly
2005 2010 2015
Trp Gly Glu Gly Ala Gly Leu Val Leu Leu Glu Arg Leu Ser Asp Ala
2020 2025 2030
Arg Arg Asn Gly His Glu Val Leu Ala Val Val Arg Gly Ser Ala Val
2035 2040 2045
Asn Gln Asp Gly Ala Ser Asn Gly Leu Thr Ala Pro Asn Gly Pro Ser
2050 2055 2060
Gln Gln Arg Val Ile Thr Gln Ala Leu Thr Ser Ala Gly Leu Ser Val
065 2070 2075 2080
Ser Asp Val Asp Ala Val Glu Ala His Gly Thr Gly Thr Arg Leu Gly
2085 2090 2095
Asp Pro Ile Glu Ala Gln Ala Leu Ile Ala Thr Tyr Gly Arg Asp Arg
2100 2105 2110
Asp Pro Gly Arg Pro Leu Trp Leu Gly Ser Val Lys Ser Asn Ile Gly
2115 2120 2125
His Thr Gln Ala Ala Ala Gly Val Ala Gly Val Ile Lys Met Val Met
2130 2135 2140
Ala Met Arg Gln Gly Glu Leu Pro Arg Thr Leu His Val Asp Glu Pro
145 2150 2155 2160
Ser Ala Gln Val Asp Trp Ser Ala Gly Thr Val Gln Leu Leu Thr Glu
2165 2170 2175
Asn Thr Pro Trp Pro Asp Ser Gly Arg Leu Arg Arg Ala Gly Val Ser
2180 2185 2190
Ser Phe Gly Ile Ser Gly Thr Asn Ala His Leu Ile Leu Glu Gln Pro
2195 2200 2205
Pro Arg Glu Ser Gln Arg Ser Thr Glu Pro Asp Ser Gly Ser Val Arg
2210 2215 2220
Asp Phe Pro Val Val Pro Trp Met Val Ser Gly Lys Thr Pro Glu Ala
225 2230 2235 2240
Leu Ser Ala Gln Ala Asp Ala Leu Met Ser Tyr Leu Ser Asn Arg Val
2245 2250 2255
Asp Ala Ser Pro Arg Asp Ile Gly Tyr Ser Leu Ala Val Thr Arg Pro
2260 2265 2270
Ala Leu Asp His Arg Ala Val Val Leu Gly Ala Asp Arg Ala Ala Leu
2275 2280 2285

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Leu Pro Gly Leu Lys Ala Leu Ala Val Ser Asn Asp Ala Ala Glu Val
 2290 2295 2300
 Ile Thr Gly Thr Arg Ala Ala Gly Pro Val Gly Phe Val Phe Ser Gly
 305 2310 2315 2320
 Gln Gly Gly Gln Trp Pro Gly Met Gly Ser Gly Leu His Ser Ala Phe
 2325 2330 2335
 Pro Val Phe Ala Asp Ala Phe Asp Glu Ala Cys Cys Glu Leu Asp Ala
 2340 2345 2350
 His Leu Gly Gln Met Ala Arg Leu Arg Asp Val Leu Ser Gly Ser Asp
 2355 2360 2365
 Thr Gln Leu Leu Asp Gln Thr Leu Trp Ala Gln Pro Gly Leu Phe Ala
 2370 2375 2380
 Leu Gln Val Gly Leu Trp Glu Leu Leu Gly Ser Trp Gly Val Arg Pro
 385 2390 2395 2400
 Ala Val Val Leu Gly His Ser Val Gly Glu Leu Ala Ala Ala Phe Ala
 2405 2410 2415
 Ala Gly Val Leu Ser Leu Arg Asp Ala Ala Arg Leu Val Ala Gly Arg
 2420 2425 2430
 Ala Arg Leu Met Gln Ala Leu Pro Thr Gly Gly Ala Met Leu Ala Ala
 2435 2440 2445
 Ala Ala Gly Glu Glu Gln Leu Arg Pro Leu Leu Ala Asp Cys Gly Asp
 2450 2455 2460
 Arg Val Gly Ile Ala Ala Val Asn Ala Pro Gly Ser Val Val Leu Ser
 465 2470 2475 2480
 Gly Asp Arg Asp Val Leu Asp Asp Ile Ala Gly Arg Leu Asp Gly Gln
 2485 2490 2495
 Gly Ile Arg Ser Arg Trp Leu Arg Val Ser His Ala Phe His Ser His
 2500 2505 2510
 Arg Met Asp Pro Met Leu Ala Glu Phe Thr Glu Ile Ala Arg Ser Val
 2515 2520 2525
 Asp Tyr Arg Ser Ser Gly Leu Pro Ile Val Ser Thr Leu Thr Gly Glu
 2530 2535 2540
 Leu Asp Glu Val Gly Met Pro Ala Thr Pro Glu Tyr Trp Val Arg Gln
 545 2550 2555 2560
 Val Arg Glu Pro Val Arg Phe Ala Asp Gly Val Ala Ala Leu Ala Ala
 2565 2570 2575
 His Gly Val Ser Thr Val Val Glu Val Gly Pro Asp Gly Val Leu Ser
 2580 2585 2590
 Ala Leu Val Gln Glu Cys Ala Ala Gly Ser Asp Gln Gly Gly Arg Val
 2595 2600 2605
 Ala Ala Val Pro Leu Met Arg Ser Asn Arg Asp Glu Ala His Thr Val
 2610 2615 2620

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Thr Thr Ala Leu Ala Gln Ile His Val Arg Gly Ala Glu Val Asp Trp
 625 2630 2635 2640
 Arg Ser Phe Phe Ala Gly Thr Gly Ala Lys Gln Val Glu Leu Pro Thr
 2645 2650 2655
 Tyr Ala Phe Gln Arg Gln Arg Tyr Trp Leu Asp Ser Pro Ser Glu Pro
 2660 2665 2670
 Val Gly Gln Ser Ala Asp Pro Ala Arg Gln Ser Gly Phe Trp Glu Leu
 2675 2680 2685
 Val Glu Gln Glu Asp Val Ser Ala Leu Ser Ala Ala Leu His Ile Thr
 2690 2695 2700
 Gly Asp His Asp Val Gln Ala Ser Leu Glu Ser Val Val Pro Val Leu
 705 2710 2715 2720
 Ser Ser Trp His Arg Arg Ile Arg Asn Glu Ser Leu Val His Gln Trp
 2725 2730 2735
 Arg Tyr Arg Ile Ser Trp His Glu Arg Ala Asp Leu Pro Asp Pro Ser
 2740 2745 2750
 Leu Ser Gly Thr Trp Leu Val Val Val Pro Glu Gly Trp Ser Ala Ser
 2755 2760 2765
 Arg Gln Val Leu Arg Phe Asn Glu Met Phe Glu Glu Arg Gly Cys Pro
 2770 2775 2780
 Ala Val Leu Phe Glu Leu Ala Gly His Asp Glu Glu Ala Leu Ala Gln
 785 2790 2795 2800
 Arg Phe Arg Ser Leu Pro Val Ala Ser Gly Gly Ile Ser Gly Val Leu
 2805 2810 2815
 Ser Leu Leu Ala Leu Asp Glu Ser Pro Ser Ser Pro Asn Ala Ala Leu
 2820 2825 2830
 Pro Asn Gly Ala Leu Asn Ser Leu Val Leu Leu Arg Ala Leu Arg Ala
 2835 2840 2845
 Ala Asp Val Ser Ala Pro Leu Trp Leu Ala Thr Cys Gly Gly Val Ala
 2850 2855 2860
 Val Gly Asp Val Pro Val Asn Pro Gly Gln Ala Leu Val Trp Gly Leu
 865 2870 2875 2880
 Gly Arg Val Val Gly Leu Glu His Pro Ala Trp Trp Gly Gly Leu Val
 2885 2890 2895
 Asp Val Pro Cys Leu Leu Asp Glu Asp Ala Arg Glu Arg Leu Ser Val
 2900 2905 2910
 Val Leu Ala Gly Leu Gly Glu Asp Glu Ile Ala Val Arg Pro Gly Gly
 2915 2920 2925
 Val Phe Val Arg Arg Leu Glu Arg Ala Gly Ala Ala Ser Gly Ala Gly
 2930 2935 2940
 Ser Val Trp Arg Pro Arg Gly Thr Val Leu Val Thr Gly Gly Thr Gly
 945 2950 2955 2960

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Gly Leu Gly Ala His Val Ala Arg Trp Leu Ala Gly Ala Gly Ala Glu
2965 2970 2975
His Val Val Leu Thr Ser Arg Arg Gly Ala Ala Ala Pro Gly Ala Gly
2980 2985 2990
Asp Leu Arg Ala Glu Leu Glu Ala Leu Gly Ala Arg Val Ser Ile Thr
2995 3000 3005
Ala Cys Asp Val Ala Asp Arg Asp Ala Leu Ala Glu Val Leu Ala Thr
3010 3015 3020
Ile Pro Asp Asp Cys Pro Leu Thr Ala Val Met His Ala Ala Gly Val
025 3030 3035 3040
Val Glu Val Gly Asp Val Ala Ser Met Cys Leu Thr Asp Phe Val Gly
3045 3050 3055
Val Leu Ser Ala Lys Ala Gly Gly Ala Ala Asn Leu Asp Glu Leu Leu
3060 3065 3070
Ala Asp Val Glu Leu Asp Ala Phe Val Leu Phe Ser Ser Val Ser Gly
3075 3080 3085
Val Trp Gly Ala Gly Gly Gln Gly Ala Tyr Ala Ala Ala Asn Ala Tyr
3090 3095 3100
Leu Asp Ala Leu Ala Gln Gln Arg Arg Ala Arg Gly Leu Val Gly Thr
105 3110 3115 3120
Ala Val Ala Trp Gly Pro Trp Ala Gly Asp Gly Met Ala Ala Gly Glu
3125 3130 3135
Gly Gly Ala Gln Leu Arg Arg Ala Gly Leu Val Pro Met Ala Ala Asp
3140 3145 3150
Arg Ala Leu Leu Ala Leu Gln Gly Ala Leu Asp Arg Asp Glu Thr Ser
3155 3160 3165
Leu Val Val Ala Asp Met Ala Trp Glu Arg Phe Ala Pro Val Phe Ala
3170 3175 3180
Met Ser Arg Arg Arg Pro Leu Leu Asp Glu Leu Pro Glu Ala Gln Gln
185 3190 3195 3200
Ala Leu Ala Asp Ala Glu Asn Thr Thr Asp Ala Ala Asp Ser Ala Val
3205 3210 3215
Pro Leu Pro Arg Leu Ala Gly Met Ala Ala Ala Glu Arg Arg Arg Ala
3220 3225 3230
Met Leu Asp Leu Val Leu Ala Glu Ala Ser Ile Val Leu Gly His Asn
3235 3240 3245
Gly Ser Asp Pro Val Gly Pro Asp Arg Ala Phe Gln Glu Leu Gly Phe
3250 3255 3260
Asp Ser Leu Met Ala Val Glu Leu Arg Asn Arg Leu Gly Glu Ala Thr
265 3270 3275 3280
Gly Leu Ser Leu Pro Ala Thr Leu Ile Phe Asp Tyr Pro Ser Pro Ser
3285 3290 3295

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Ala Leu Ala Glu Gln Leu Val Gly Glu Leu Val Gly Ala Gln Pro Ala
3300 3305 3310

Thr Thr Val Val Ala Gly Ala Asp Pro Val Asp Asp Pro Val Val Val
3315 3320 3325

Val Ala Met Gly Cys Arg Tyr Pro Gly Asp Val Cys Ser Pro Glu Glu
3330 3335 3340

Leu Trp Gln Leu Val Ser Ala Gly Arg Asp Ala Val Ser Thr Phe Pro
3345 3350 3355 3360

Val Asp Arg Gly Trp Asp Cys Asn Thr Leu Phe Asp Pro Asp Pro Asp
3365 3370 3375

Arg Ala Gly Ser Thr Tyr Val Arg Glu Gly Ala Phe Leu Thr Gly Ala
3380 3385 3390

Asp Arg Phe Asp Ala Gly Phe Phe Gly Ile Ser Pro Arg Glu Ala Arg
3395 3400 3405

Ala Met Asp Pro Gln Gln Arg Leu Leu Leu Glu Val Ala Trp Glu Val
3410 3415 3420

Phe Glu Arg Ala Gly Ile Ala Pro Leu Ser Leu Arg Gly Ser Arg Thr
3425 3430 3435 3440

Gly Val Phe Ala Gly Thr Asn Gly Gln Asp His Gly Ala Lys Val Ala
3445 3450 3455

Ala Ala Pro Glu Ala Ala Gly His Leu Leu Thr Gly Asn Ala Ala Ser
3460 3465 3470

Val Leu Ala Gly Arg Leu Ser Tyr Thr Phe Gly Leu Glu Gly Pro Ala
3475 3480 3485

Val Ala Val Asp Thr Ala Cys Ser Ser Ser Leu Val Ala Leu His Leu
3490 3495 3500

Ala Cys Gln Ser Leu Arg Ser Gly Glu Cys Asp Met Ala Leu Ala Gly
3505 3510 3515 3520

Gly Val Thr Val Met Ser Thr Pro Leu Ala Phe Leu Glu Phe Ser Arg
3525 3530 3535

Gln Arg Gly Leu Ala Pro Asp Gly Arg Cys Lys Ser Phe Ala Ala Ala
3540 3545 3550

Ala Asp Gly Thr Gly Trp Gly Glu Gly Ala Gly Leu Val Leu Leu Glu
3555 3560 3565

Arg Leu Ser Asp Ala Arg Arg Asn Gly His Arg Val Leu Ala Val Val
3570 3575 3580

Arg Gly Ser Ala Val Asn Gln Asp Gly Ala Ser Asn Gly Leu Thr Ala
3585 3590 3595 3600

Pro Asn Gly Pro Ser Gln Gln Arg Val Ile Arg Gln Ala Leu Ala Asn
3605 3610 3615

Ala Gly Leu Ser Ala Ser Asp Val Asp Val Val Glu Ala His Gly Thr
3620 3625 3630

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Gly Thr Gly Leu Gly Asp Pro Ile Glu Ala Gln Ala Leu Ile Ala Thr
3635 3640 3645

Tyr Gly Gln Glu Arg Asp Pro Glu Arg Ala Leu Trp Leu Gly Ser Ile
3650 3655 3660

Lys Ser Asn Ile Gly His Thr Gln Ala Ala Ala Gly Val Ala Gly Val
665 3670 3675 3680

Ile Lys Met Val Gln Ala Met Arg His Gly Glu Leu Pro Ala Thr Leu
3685 3690 3695

His Val Asp Lys Pro Thr Pro Gln Val Asp Trp Ser Ala Gly Ala Val
3700 3705 3710

Arg Leu Leu Thr Gly Asn Thr Pro Trp Pro Glu Ser Gly Arg Pro Arg
3715 3720 3725

Arg Ala Gly Val Ser Ser Phe Gly Ile Ser Gly Thr Asn Ala His Leu
3730 3735 3740

Ile Leu Glu Gln Pro Pro Ser Glu Pro Ala Glu Ile Asp Gln Ser Asp
745 3750 3755 3760

Arg Arg Val Thr Ala His Pro Ala Val Ile Pro Trp Met Leu Ser Ala
3765 3770 3775

Arg Ser Leu Ala Ala Leu Gln Ala Gln Ala Ala Ala Leu Gln Ala Arg
3780 3785 3790

Leu Asp Arg Gly Pro Gly Ala Ser Pro Leu Asp Leu Gly Tyr Ser Leu
3795 3800 3805

Ala Thr Thr Arg Ser Val Leu Asp Glu Arg Ala Val Val Trp Gly Ala
3810 3815 3820

Asp Arg Glu Ala Leu Leu Ser Arg Leu Ala Ala Leu Ala Asp Gly Arg
825 3830 3835 3840

Thr Ala Pro Gly Val Ile Thr Gly Ser Ala Asn Ser Gly Gly Arg Ile
3845 3850 3855

Gly Phe Val Phe Ser Gly Gln Gly Ser Gln Trp Leu Gly Met Gly Lys
3860 3865 3870

Ala Leu Cys Ala Ala Phe Pro Ala Phe Ala Asp Ala Phe Glu Glu Ala
3875 3880 3885

Cys Asp Ala Leu Ser Ala His Leu Gly Ala Asp Val Arg Gly Val Leu
3890 3895 3900

Phe Gly Ala Asp Glu Gln Met Leu Asp Arg Thr Leu Trp Ala Gln Ser
905 3910 3915 3920

Gly Ile Phe Ala Val Gln Val Gly Leu Leu Gly Leu Leu Arg Ser Trp
3925 3930 3935

Gly Val Arg Pro Ala Ala Val Leu Gly His Ser Val Gly Glu Leu Ala
3940 3945 3950

Ala Ala His Ala Ala Gly Val Leu Ser Leu Pro Asp Ala Ala Arg Leu
3955 3960 3965

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Val Ala Ala Arg Ala His Leu Met Gln Ala Leu Pro Thr Gly Gly Ala
3970 3975 3980

Met Leu Ala Val Ala Thr Ser Glu Ala Ala Val Gly Pro Leu Leu Ser
3985 3990 3995 4000

Gly Val Cys Asp Arg Val Ser Ile Ala Ala Ile Asn Gly Pro Glu Ser
4005 4010 4015

Val Val Leu Ser Gly Asp Arg Asp Val Leu Val Glu Leu Ala Gly Glu
4020 4025 4030

Phe Asp Ala Arg Gly Leu Arg Thr Lys Trp Leu Arg Val Ser His Ala
4035 4040 4045

Phe His Ser His Arg Met Glu Pro Ile Leu Asp Glu Tyr Ala Glu Thr
4050 4055 4060

Ala Arg Cys Val Glu Phe Gly Glu Pro Val Val Pro Ile Val Ser Ala
4065 4070 4075 4080

Ala Thr Gly Ala Leu Asp Thr Thr Gly Leu Met Cys Ala Ala Asp Tyr
4085 4090 4095

Trp Thr Arg Gln Val Arg Asp Pro Val Arg Phe Gly Asp Gly Val Arg
4100 4105 4110

Ala Leu Val Gly Gln Gly Val Asp Thr Ile Val Glu Phe Gly Pro Asp
4115 4120 4125

Gly Ala Leu Ser Ala Leu Val Glu Gln Cys Leu Ala Gly Ser Asp Gln
4130 4135 4140

Ala Gly Arg Val Ala Ala Ile Pro Leu Met Arg Arg Asp Arg Asp Glu
4145 4150 4155 4160

Val Glu Thr Ala Val Ala Ala Leu Ala His Val His Val Arg Gly Gly
4165 4170 4175

Ala Val Asp Trp Ser Ala Cys Phe Ala Gly Thr Gly Ala Arg Thr Val
4180 4185 4190

Glu Leu Pro Thr Tyr Ala Phe Gln Arg Gln Arg Tyr Trp Leu Ala Gly
4195 4200 4205

Gln Ala Asp Gly Arg Gly Gly Asp Val Val Ala Asp Pro Val Asp Ala
4210 4215 4220

Arg Phe Trp Glu Leu Val Glu Arg Ala Asp Pro Glu Pro Leu Val Asp
4225 4230 4235 4240

Glu Leu Cys Ile Asp Arg Asp Gln Pro Phe Arg Glu Val Leu Pro Val
4245 4250 4255

Leu Ala Ser Trp Arg Glu Lys Gln Arg Gln Glu Ala Leu Ala Asp Ser
4260 4265 4270

Trp Arg Tyr Gln Val Arg Trp Arg Ser Val Glu Val Pro Ser Ala Ala
4275 4280 4285

Ala Leu Arg Gly Val Trp Leu Val Val Leu Pro Ala Asp Val Pro Arg
4290 4295 4300

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Asp Gln Pro Ala Val Val Ile Asp Ala Leu Ile Ala Arg Gly Ala Glu
 305 4310 4315 4320
 Val Ala Val Leu Glu Leu Thr Glu Gln Asp Leu Gln Arg Ser Ala Leu
 4325 4330 4335
 Val Asp Lys Val Arg Ala Val Ile Ala Asp Arg Thr Glu Val Thr Gly
 4340 4345 4350
 Val Leu Ser Leu Leu Ala Met Asp Gly Met Pro Cys Ala Ala His Pro
 4355 4360 4365
 His Leu Ser Arg Gly Val Ala Ala Thr Val Ile Leu Thr Gln Val Leu
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 Gly Asp Ala Gly Val Ser Ala Pro Leu Trp Leu Ala Thr Thr Gly Gly
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 Val Glu Ala Gly Thr Glu Asp Gly Pro Ala Asp Pro Asp His Gly Leu
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 Ile Trp Gly Leu Gly Arg Val Val Gly Leu Glu His Pro Gln Trp Trp
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 Gly Gly Leu Ile Asp Leu Pro Glu Thr Leu Asp Glu Thr Ser Arg Asn
 4435 4440 4445
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 Val Arg Ser Ser Gly Leu Phe Val Arg Arg Val Val Arg Ala Ala Arg
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 Asn Pro Arg Ser Glu Thr Trp Arg Ser Arg Gly Thr Val Leu Ile Thr
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 Pro Gly Ala Ala Asp Leu Gly Ala Glu Leu Thr Glu Leu Gly Val Lys
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 Val Leu Ala Ala Val Pro Thr Glu Tyr Pro Leu Ser Ala Val Val His
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 Gln Phe Ala Asp Val Leu Ser Ala Lys Val Val Gly Ala Ala Asn Leu
 4595 4600 4605
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 Ser Ile Ser Gly Val Trp Gly Ala Gly Gly Gln Gly Ala Tyr Ser Ala
 625 4630 4635 4640

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Ala Asn Ala Tyr Leu Asp Ala Leu Ala Glu Arg Arg Arg Ala Cys Gly
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Arg Pro Ala Thr Cys Ile Ala Trp Gly Pro Trp Ala Gly Ala Gly Met
4660 4665 4670

Ala Val Gln Glu Gly Asn Glu Ala His Leu Arg Arg Arg Gly Leu Val
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Pro Met Glu Pro Gln Ser Ala Leu Phe Ala Leu Gln Gln Ala Leu Ser
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Gln Arg Glu Thr Ala Ile Thr Val Ala Asp Val Asp Trp Glu Arg Phe
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Ala Ala Ser Phe Thr Ala Ala Arg Pro Arg Pro Leu Leu Glu Glu Ile
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Val Asp Leu Arg Pro Asp Thr Glu Thr Glu Glu Lys His Gly Ala Gly
4740 4745 4750

Glu Leu Gly Gln Gln Leu Ala Ala Leu Pro Pro Ala Glu Arg Gly His
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Leu Leu Leu Glu Val Val Leu Ala Glu Thr Ala Ser Thr Leu Gly His
4770 4775 4780

Asp Ser Ala Glu Ala Val Gln Pro Asp Arg Thr Phe Ala Glu Leu Gly
785 4790 4795 4800

Phe Asp Ser Leu Thr Ala Val Glu Leu Arg Asn Arg Leu Asn Ala Val
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Thr Gly Leu Arg Leu Pro Pro Thr Leu Val Phe Asp His Pro Thr Pro
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Leu Ala Leu Ser Glu Gln Leu Val Pro Ala Leu Val Ala Glu Pro Asp
4835 4840 4845

Asn Gly Ile Glu Ser Leu Leu Ala Glu Leu Asp Arg Leu Asp Thr Thr
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Leu Ala Gln Gly Pro Ser Ile Pro Leu Glu Asp Gln Ala Lys Val Ala
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Glu Arg Leu His Ala Leu Leu Ala Lys Trp Asp Gly Ala Arg Asp Gly
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<223> ORF22; polyketide synthase

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| 1 5 10 15 | |
| gaa ctg gaa gag gcg cac gaa cgc ctg cac gag ttg gag cgc cag gag | 96 |
| Glu Leu Glu Glu Ala His Glu Arg Leu His Glu Leu Glu Arg Gln Glu | |
| 20 25 30 | |
| cac gac ccc atc gcg atc gtg tct atg gga tgt cgt tat ccc ggt ggc | 144 |
| His Asp Pro Ile Ala Ile Val Ser Met Gly Cys Arg Tyr Pro Gly Gly | |
| 35 40 45 | |
| gtc tcc act ccg gag gag ctg tgg cga ctg gtc gtc gac gga gga gac | 192 |
| Val Ser Thr Pro Glu Glu Leu Trp Arg Leu Val Val Asp Gly Gly Asp | |
| 50 55 60 | |
| gcg atc gcg aac ttc ccc gaa gac cgt ggc tgg aat ctg gac gag ctg | 240 |
| Ala Ile Ala Asn Phe Pro Glu Asp Arg Gly Trp Asn Leu Asp Glu Leu | |
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| ttc gat cct gat ccg ggc cga gcc ggg acc tcc tac gtc cgc gag ggt | 288 |
| Phe Asp Pro Asp Pro Gly Arg Ala Gly Thr Ser Tyr Val Arg Glu Gly | |
| 85 90 95 | |
| ggt ttc ctg cgc ggg gtc gcg gac ttc gat gcc ggg ctc ttc ggg atc | 336 |
| Gly Phe Leu Arg Gly Val Ala Asp Phe Asp Ala Gly Leu Phe Gly Ile | |
| 100 105 110 | |
| agt ccg cgc gag gca cag gcg atg gac ccg caa cag cgg ttg ctg ctg | 384 |
| Ser Pro Arg Glu Ala Gln Ala Met Asp Pro Gln Gln Arg Leu Leu Leu | |
| 115 120 125 | |
| gag atc tct tgg gag gtg ttc gag cgc gcc ggc att gac ccg ttt tct | 432 |
| Glu Ile Ser Trp Glu Val Phe Glu Arg Ala Gly Ile Asp Pro Phe Ser | |
| 130 135 140 | |
| ttg cgg ggt acc aag acc ggt gtg ttc gcg ggc ctg atc tac cac gac | 480 |
| Leu Arg Gly Thr Lys Thr Gly Val Phe Ala Gly Leu Ile Tyr His Asp | |
| 145 150 155 160 | |
| tac gcg tct cgg ttt cgc aag acc ccc gcg gag ttc gag ggt tac ttc | 528 |
| Tyr Ala Ser Arg Phe Arg Lys Thr Pro Ala Glu Phe Glu Gly Tyr Phe | |
| 165 170 175 | |
| gcc acc ggc aac gcg ggc agc gtc gca tcc ggc cgg gtg gct tac acc | 576 |
| Ala Thr Gly Asn Ala Gly Ser Val Ala Ser Gly Arg Val Ala Tyr Thr | |
| 180 185 190 | |
| ttc ggg tta gag ggc ccg gcg gtc acc gtg gac acc gcc tgc tct tct | 624 |
| Phe Gly Leu Glu Gly Pro Ala Val Thr Val Asp Thr Ala Cys Ser Ser | |
| 195 200 205 | |
| tcc ctg gtg gcg ctg cac ctg gcc tgc cag tcc ctg cgg ctg ggc gaa | 672 |
| Ser Leu Val Ala Leu His Leu Ala Cys Gln Ser Leu Arg Leu Gly Glu | |
| 210 215 220 | |
| tgc gac ctg gcc ctg gcc ggt ggc att tct gtg atg gcc acg ccg gga | 720 |
| Cys Asp Leu Ala Leu Ala Gly Gly Ile Ser Val Met Ala Thr Pro Gly | |
| 225 230 235 240 | |

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| | | | | | | | | | | | | | | | | |
|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|------|
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| tgc Cys | aag Lys | ccc Pro | ttc Phe 260 | gcg Ala | gat Asp | gcc Ala | gcc Ala | gac Asp 265 | ggc Gly | acc Thr | ggc Gly | tgg Trp | ggc Gly 270 | gag Glu | ggc Gly | 816 |
| gcc Ala | gga Gly | atg Met 275 | ctg Leu | ctg Leu | ctg Leu | gaa Glu | cgg Arg 280 | ctg Leu | tcg Ser | gac Asp | gca Ala | cga Arg 285 | cga Arg | aac Asn | ggc Gly | 864 |
| cac His | ccg Pro 290 | gtg Val | ctg Leu | gcg Ala | gcg Ala | gtg Val 295 | gtc Val | ggg Gly | tcc Ser | gcg Ala | atc Ile 300 | aac Asn | cag Gln | gac Asp | ggg Gly | 912 |
| acg Thr 305 | tcc Ser | aac Asn | ggc Gly | ctg Leu | acc Thr 310 | gcg Ala | ccc Pro | agc Ser | ggg Gly | ccc Pro 315 | gca Ala | cag Gln | cag Gln | cga Arg | gtg Val 320 | 960 |
| atc Ile | cgc Arg | caa Gln | gcc Ala | ctg Leu 325 | gcg Ala | aac Asn | gcc Ala | ggg Gly | ttg Leu 330 | tcg Ser | ccc Pro | gcc Ala | gag Glu | gtc Val 335 | gat Asp | 1008 |
| gtg Val | gtc Val | gag Glu | gcg Ala 340 | cac His | ggc Gly | acg Thr | ggc Gly | acg Thr 345 | gcc Ala | ttg Leu | ggc Gly | gac Asp | ccg Pro 350 | atc Ile | gag Glu | 1056 |
| gcg Ala | cag Gln | gcc Ala 355 | ctg Leu | atc Ile | gcc Ala | acc Thr | tac Tyr 360 | ggg Gly | gcg Ala | aac Asn | cgg Arg 365 | tcg Ser 365 | gcg Ala | gat Asp | cat His | 1104 |
| ccg Pro 370 | ctg Leu | ctg Leu | ctg Leu | ggg Gly | tcc Ser | ctc Leu 375 | aag Lys | tcg Ser | aac Asn | atc Ile | ggc Gly 380 | cac His | acc Thr | cag Gln | gct Ala | 1152 |
| gcc Ala 385 | gcc Ala | ggg Gly | gtg Val | gcc Ala | ggg Gly 390 | gtg Val | atc Ile | aag Lys | tcg Ser | gtc Val 395 | ctg Leu | gcc Ala | atc Ile | agg Arg | cac His 400 | 1200 |
| cgg Arg | gag Glu | atg Met | ccc Pro | cgc Arg 405 | agc Ser | ctg Leu | cac His | atc Ile | gac Asp 410 | cag Gln | cca Pro | tcg Ser | cag Gln | cac His 415 | gtg Val | 1248 |
| gac Asp | tgg Trp | tcg Ser | gcg Ala 420 | ggc Gly | gcg Ala | gtg Val | cgg Arg | ctg Leu 425 | ctc Leu | acg Thr | gac Asp | agc Ser | gtt Val 430 | gac Asp | tgg Trp | 1296 |
| ccg Pro | gat Asp | ctc Leu 435 | ggc Gly | agg Arg | ccg Pro | cgc Arg | cga Arg 440 | gca Ala | ggg Gly | gtg Val | tcc Ser | tcg Ser 445 | ttc Phe | ggc Gly | atg Met | 1344 |
| agc Ser | ggg Gly 450 | acc Thr | aac Asn | gca Ala | cac His | ctg Leu 455 | atc Ile | gtc Val | gag Glu | gaa Glu | gta Val 460 | tcc Ser | gac Asp | gag Glu | ccg Pro | 1392 |
| gtc Val 465 | tcg Ser | ggc Gly | agt Ser | acc Thr | gag Glu 470 | ccg Pro | acc Thr | ggg Gly | gca Ala | ttt Phe 475 | ccc Pro | tgg Trp | ccg Pro | ctg Leu | tcc Ser 480 | 1440 |
| ggc Gly | aag Lys | acg Thr | gag Glu | acg Thr | gca Ala | ttg Leu | cgc Arg | gag Glu | cag Gln | gct Ala | gcc Ala | gag Glu | ttg Leu | ctc Leu | tcc Ser | 1488 |

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|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|------|
| 485 | | | | | 490 | | | | | 495 | | | | | | |
| gta Val | gtg Val | acc Thr | gag Glu 500 | cac His | ccg Pro | gag Glu | ccg Pro | gga Gly 505 | ctg Leu | ggg Gly | gac Asp | gtc Val | ggg Gly 510 | tac Tyr | tcg Ser | 1584 |
| ctg Leu | gcc Ala | acc Thr 515 | ggt Gly | cgc Arg | gct Ala | gcg Ala | atg Met 520 | gag Glu | cac His | cgg Arg | gct Ala | gtc Val 525 | gtg Val | gtt Val | gcc Ala | |
| gac Asp | gat Asp 530 | cgg Arg | gac Asp | tct Ser | ttc Phe | gtc Val 535 | gcc Ala | gga Gly | ctg Leu | acg Thr | gcg Ala 540 | ttg Leu | gct Ala | gcg Ala | ggc Gly | 1680 |
| gtt Val 545 | ccg Pro | gca Ala | gcc Ala | aac Asn | gtg Val 550 | gtg Val | cag Gln | ggc Gly | gcg Ala 555 | gcc Ala | gac Asp | tgc Cys | aag Lys | gga Gly | aag Lys 560 | |
| gtc Val | gcg Ala | ttc Phe | gtg Val | ttc Phe 565 | ccc Pro | ggc Gly | cag Gln | ggc Gly | tcg Ser 570 | cat His | tgg Trp | cag Gln | ggg Gly | atg Met 575 | gcg Ala | 1776 |
| agg Arg | gaa Glu | ctg Leu | tcc Ser 580 | gaa Glu | tcc Ser | tcg Ser | ccg Pro | gtg Val 585 | ttc Phe | cgg Arg | ccg Arg | aag Lys | ctg Leu 590 | gcg Ala | gaa Glu | |
| tgc Cys | gcg Ala | gcg Ala 595 | gct Ala | acg Thr | gcc Ala | cct Pro | tac Tyr 600 | gtg Val | gac Asp | tgg Trp | tcg Ser | ctg Leu 605 | ctc Leu | ggc Gly | gtc Val | 1872 |
| ctt Leu | cgc Arg 610 | ggt Gly | gat Asp | ccc Pro | gat Asp | gca Ala 615 | ccc Pro | gcg Ala | ctg Leu | gat Asp | cgc Arg 620 | gac Asp | gac Asp | gtg Val | att Ile | |
| cag Gln 625 | ctc Leu | gcg Ala | ctg Leu | ttc Phe | gcc Ala 630 | atg Met | atg Met | gtg Val | tcg Ser | ctg Leu 635 | gcc Ala | gaa Glu | ctg Leu | tgg Trp | cgt Arg 640 | 1968 |
| tcg Ser | tgc Cys | gga Gly | gtg Val | gag Glu 645 | ccc Pro | gcc Ala | gcg Ala | gtg Val | gtc Val 650 | ggg Gly | cat His | tcc Ser | cag Gln | ggc Gly 655 | gag Glu | |
| atc Ile | gcc Ala | gcc Ala | gcc Ala 660 | cat His | gtg Val | gca Ala | ggc Gly | gct Ala 665 | ttg Leu | tcc Ser | ttg Leu | act Thr | gat Asp 670 | gcg Ala | gtg Val | 2064 |
| cgc Arg | atc Ile | atc Ile 675 | gct Ala | gcc Ala | cgc Arg | tgc Cys | gat Asp 680 | gcg Ala | gtg Val | tcg Ser | gcg Ala | ctg Leu 685 | acc Thr | ggg Gly | aag Lys | |
| gga Gly | ggc Gly 690 | atg Met | ctc Leu | gcg Ala | att Ile | gcc Ala 695 | ttg Leu | ccg Pro | gaa Glu | agc Ser | gcg Ala 700 | gtg Val | gtg Val | aag Lys | cga Arg | 2160 |
| atc Ile 705 | gca Ala | ggc Gly | ctg Leu | ccg Pro | gag Glu 710 | ctg Leu | acc Thr | gtt Val | gcg Ala | gcg Ala 715 | gtc Val | aac Asn | gga Gly | ccc Pro | ggc Gly 720 | |
| tcc Ser | act Thr | gtc Val | gtt Val | tcc Ser 725 | ggc Gly | gaa Glu | ccg Pro | tcg Ser | gct Ala 730 | ctg Leu | gag Glu | cgt Arg | ctg Leu | cag Gln 735 | acc Thr | 2256 |
| gaa | ctg | acc | gcg | gaa | aac | gtg | cag | acc | cgg | cgg | gtg | gga | att | gat | tac | |

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|-------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|
| Glu | Leu | Thr | Ala | Glu | Asn | Val | Gln | Thr | Arg | Arg | Val | Gly | Ile | Asp | Tyr |
| | | | 740 | | | | | 745 | | | | | 750 | | |
| gcc | tcg | cat | tcg | ccg | cag | atc | gcg | cag | gtc | cag | ggc | cgg | ctt | ctg | gac |
| Ala | Ser | His | Ser | Pro | Gln | Ile | Ala | Gln | Val | Gln | Gly | Arg | Leu | Leu | Asp |
| | | 755 | | | | | 760 | | | | 765 | | | | 2304 |
| cgg | ctg | ggc | gaa | gtc | ggg | tcc | gaa | cct | gct | gag | atc | gct | ttc | tac | tcg |
| Arg | Leu | Gly | Glu | Val | Gly | Ser | Glu | Pro | Ala | Glu | Ile | Ala | Phe | Tyr | Ser |
| | 770 | | | | | 775 | | | | | 780 | | | | 2352 |
| acg | gtc | acc | ggc | gag | cgg | acg | gac | acc | ggc | cga | ctc | gac | gcc | gac | tac |
| Thr | Val | Thr | Gly | Glu | Arg | Thr | Asp | Thr | Gly | Arg | Leu | Asp | Ala | Asp | Tyr |
| | 785 | | | | 790 | | | | | 795 | | | | | 800 |
| 2400 | | | | | | | | | | | | | | | |
| tgg | tac | cag | aac | ctt | cgg | cag | ccc | gtc | cgc | ttc | cag | cag | acc | gtc | gcc |
| Trp | Tyr | Gln | Asn | Leu | Arg | Gln | Pro | Val | Arg | Phe | Gln | Gln | Thr | Val | Ala |
| | | | 805 | | | | | | 810 | | | | | 815 | |
| 2448 | | | | | | | | | | | | | | | |
| cgg | atg | gca | gat | cag | ggc | tat | cgg | ttc | ttc | gtc | gag | gtg | agc | ccg | cac |
| Arg | Met | Ala | Asp | Gln | Gly | Tyr | Arg | Phe | Phe | Val | Glu | Val | Ser | Pro | His |
| | | | 820 | | | | | 825 | | | | | 830 | | |
| 2496 | | | | | | | | | | | | | | | |
| ccg | ctg | ctc | acc | gcc | gga | atc | cag | gaa | acg | ctg | gaa | gcc | gcg | gac | gcg |
| Pro | Leu | Leu | Thr | Ala | Gly | Ile | Gln | Glu | Thr | Leu | Glu | Ala | Ala | Asp | Ala |
| | | 835 | | | | | 840 | | | | | 845 | | | |
| 2544 | | | | | | | | | | | | | | | |
| ggc | ggg | gtg | gtg | gtc | ggg | tcg | ctg | cgg | cgt | ggc | gag | ggc | ggc | tcc | cgg |
| Gly | Gly | Val | Val | Val | Gly | Ser | Leu | Arg | Arg | Gly | Glu | Gly | Gly | Ser | Arg |
| | 850 | | | | | 855 | | | | | 860 | | | | |
| 2592 | | | | | | | | | | | | | | | |
| cgc | tgg | ctg | act | tcg | ctg | gcc | gag | tgc | cag | gtg | cgc | gga | ctg | ccg | gtg |
| Arg | Trp | Leu | Thr | Ser | Leu | Ala | Glu | Cys | Gln | Val | Arg | Gly | Leu | Pro | Val |
| | 865 | | | | 870 | | | | | 875 | | | | | 880 |
| 2640 | | | | | | | | | | | | | | | |
| aat | tgg | gaa | cag | gta | ttc | ctc | aac | acc | gga | gcc | cga | cgc | gtg | ccg | ctg |
| Asn | Trp | Glu | Gln | Val | Phe | Leu | Asn | Thr | Gly | Ala | Arg | Arg | Val | Pro | Leu |
| | | | | 885 | | | | | 890 | | | | | 895 | |
| 2688 | | | | | | | | | | | | | | | |
| ccg | acc | tac | ccg | ttc | cag | cgg | cag | cgg | tac | tgg | ttg | gag | tcc | gcc | gag |
| Pro | Thr | Tyr | Pro | Phe | Gln | Arg | Gln | Arg | Tyr | Trp | Leu | Glu | Ser | Ala | Glu |
| | | | 900 | | | | | 905 | | | | | 910 | | |
| 2736 | | | | | | | | | | | | | | | |
| tac | gac | gcg | ggc | gat | ctc | ggg | tcg | gtg | ggc | ttg | ctc | tcc | gcc | gag | cat |
| Tyr | Asp | Ala | Gly | Asp | Leu | Gly | Ser | Val | Gly | Leu | Leu | Ser | Ala | Glu | His |
| | | 915 | | | | | 920 | | | | | 925 | | | |
| 2784 | | | | | | | | | | | | | | | |
| ccc | ctg | ctc | ggg | gct | gcg | gtg | acg | ctg | gcc | gat | gcg | ggc | ggg | ttc | ctg |
| Pro | Leu | Leu | Gly | Ala | Ala | Val | Thr | Leu | Ala | Asp | Ala | Gly | Gly | Phe | Leu |
| | 930 | | | | | 935 | | | | | 940 | | | | |
| 2832 | | | | | | | | | | | | | | | |
| ctg | acc | ggc | aag | ctg | tcg | gtc | aag | acc | cag | ccc | tgg | ttg | gcc | gac | cac |
| Leu | Thr | Gly | Lys | Leu | Ser | Val | Lys | Thr | Gln | Pro | Trp | Leu | Ala | Asp | His |
| | 945 | | | | 950 | | | | | 955 | | | | | 960 |
| 2880 | | | | | | | | | | | | | | | |
| gtg | gtc | ggc | ggg | gcg | atc | ctg | ctg | ccc | ggc | acc | gcg | ttc | gtg | gaa | atg |
| Val | Val | Gly | Gly | Ala | Ile | Leu | Leu | Pro | Gly | Thr | Ala | Phe | Val | Glu | Met |
| | | | | 965 | | | | | 970 | | | | | 975 | |
| 2928 | | | | | | | | | | | | | | | |
| ctg | ata | cgc | gcc | gcg | gac | cag | gtc | ggg | tgc | gat | ctg | atc | gag | gag | ttg |
| Leu | Ile | Arg | Ala | Ala | Asp | Gln | Val | Gly | Cys | Asp | Leu | Ile | Glu | Glu | Leu |
| | | | 980 | | | | | 985 | | | | | 990 | | |
| 2976 | | | | | | | | | | | | | | | |

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| | |
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| cag atc gcg gtt ggc ggt ccg gac gag gcc ggg cgc cgc tcg gtc cgc Gln Ile Ala Val Gly Gly 1010 Pro Asp Glu Ala Gly Arg Arg Ser Val Arg 1020 | 3072 |
| gtg cat tcc tgt cga gac gac gcc gtg ccg cag gac tcg tgg acc tgc Val His Ser Cys Arg Asp Asp Ala Val Pro Gln Asp Ser Trp Thr Cys 1025 1030 1035 1040 | 3120 |
| cac gcg acc ggc acg ttg acc tcc agc gat cac cag gac gcc ggc cag His Ala Thr Gly 1045 Leu Thr Ser Ser Asp 1050 His Gln Asp Ala Gly Gln 1055 | 3168 |
| ggc ccc gat ggg att tgg ccg ccc aac gat gct gtc gcg gtt ccg ctg Gly Pro Asp Gly Ile Trp Pro Pro Asn Asp Ala Val Ala Val Pro Leu 1060 1065 1070 | 3216 |
| gac agc ttc tac gcc cgc gca gct gag cgg ggc ttc gat ttc ggc ccg Asp Ser Phe Tyr Ala Arg Ala Ala Glu Arg Gly Phe Asp Phe Gly Pro 1075 1080 1085 | 3264 |
| gcg ttc cag ggg ttg cag gcg gct tgg aag cgc gga gac gag atc ttc Ala Phe Gln Gly Leu Gln Ala Ala Trp Lys Arg Gly Asp Glu Ile Phe 1090 1095 1100 | 3312 |
| gcc gag gtc ggc ctg ccc acc gca cac cgc gaa gac gcc ggc agg ttc Ala Glu Val Gly Leu Pro Thr Ala His Arg Glu Asp Ala Gly Arg Phe 1105 1110 1115 1120 | 3360 |
| gga atc cac cct gct ctg ctg gat gcg gca ctg cag gcg ctg ggc gca Gly Ile His Pro Ala Leu Leu Asp Ala Ala Leu Gln Ala Leu Gly Ala 1125 1130 1135 | 3408 |
| gcc gaa gag gat ccg gac gag gga tgg ctc ccg ttc gcg tgg caa ggt Ala Glu Glu Asp Pro Asp Glu Gly Trp Leu Pro Phe Ala Trp Gln Gly 1140 1145 1150 | 3456 |
| gtg tcc ctc aaa gcg acg ggc gca ctt tcc ctt cgg gtg cac ctc gtt Val Ser Leu Lys Ala Thr Gly Ala Leu Ser Leu Arg Val His Leu Val 1155 1160 1165 | 3504 |
| ccg gcg ggc gcg aat gcg gtg tcg gtg ttc acg acc gac acg act ggc Pro Ala Gly Ala Asn Ala Val Ser Val Phe Thr Thr Asp Thr Thr Gly 1170 1175 1180 | 3552 |
| caa gcc gtg ctc tcc atc gat tcg ctg gtg ctg cgc cag att tcg gac Gln Ala Val Leu Ser Ile Asp Ser Leu Val Leu Arg Gln Ile Ser Asp 1185 1190 1195 1200 | 3600 |
| aag cag ttg gca gcg gcc cgt gcg atg gaa cac gag tcc ctg ttc cgg Lys Gln Leu Ala Ala Ala Arg Ala Met Glu His Glu Ser Leu Phe Arg 1205 1210 1215 | 3648 |
| gtc gac tgg aag cga atc tcg ccc ggc gct gcc aag ccg gtc tcc tgg Val Asp Trp Lys Arg Ile Ser Pro Gly Ala Ala Lys Pro Val Ser Trp 1220 1225 1230 | 3696 |
| gca gtg atc ggc aat gac gaa ctc gcc cga gcc tgc ggc tcg gca ctt Ala Val Ile Gly Asn Asp Glu Leu Ala Arg Ala Cys Gly Ser Ala Leu 1235 1240 1245 | 3744 |

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| | |
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| ggc acg gaa ctc cac ccc gac ctg acc ggg ttg gct gac ccg ccc ccg Gly Thr Glu Leu His Pro Asp Leu Thr Gly Leu Ala Asp Pro Pro Pro 1250 1255 1260 | 3792 |
| gac gtc gtg gtg gtg cca tgc ggt gcg tct cgc cag gac ttg gac gtt Asp Val Val Val Val Pro Cys Gly Ala Ser Arg Gln Asp Leu Asp Val 1265 1270 1275 1280 | 3840 |
| gct tcc gag gca cgt gcc gcg aca caa cgc atg ctt gac ctg atc cag Ala Ser Glu Ala Arg Ala Ala Thr Gln Arg Met Leu Asp Leu Ile Gln 1285 1290 1295 | 3888 |
| gat tgg ttg gcg gcg gcg cga ttc gcc gga tct cgc ctg gtg gtt gtg Asp Trp Leu Ala Ala Ala Arg Phe Ala Gly Ser Arg Leu Val Val Val 1300 1305 1310 | 3936 |
| acg tgt ggt gcg gcg tcg aca ggt ccc gcc gag ggt gtt tcc gac ctg Thr Cys Gly Ala Ala Ser Thr Gly Pro Ala Glu Gly Val Ser Asp Leu 1315 1320 1325 | 3984 |
| gtg cat gct gcg tcg tgg ggt ttg ttg cgt tcg gcg cag tcg gag aac Val His Ala Ala Ser Trp Gly Leu Leu Arg Ser Ala Gln Ser Glu Asn 1330 1335 1340 | 4032 |
| ccg gac cga ttc gtg ttg gtc gat gtg gac gga acc gcc gaa tca tgg Pro Asp Arg Phe Val Leu Val Asp Val Asp Gly Thr Ala Glu Ser Trp 1345 1350 1355 1360 | 4080 |
| cgt gcg ctc gcg gcg gcc gtg cgt tcc gga gaa ccg cag ctg gcg ttg Arg Ala Leu Ala Ala Val Arg Ser Gly Glu Pro Gln Leu Ala Leu 1365 1370 1375 | 4128 |
| cgc gcc ggt gaa gtc cgg gtg cct cgc ctg gcg cga tgt gtt gcc gcc Arg Ala Gly Glu Val Arg Val Pro Arg Leu Ala Arg Cys Val Ala Ala 1380 1385 1390 | 4176 |
| gag gac agc cgg atc cca gtg ccc ggt gcg gat ggg acg gtg ttg att Glu Asp Ser Arg Ile Pro Val Pro Gly Ala Asp Gly Thr Val Leu Ile 1395 1400 1405 | 4224 |
| tcc ggc ggt acg ggc ctg ctg ggc ggg ttg gtt gcc cgg cat ttg gtg Ser Gly Gly Thr Gly Leu Leu Gly Gly Leu Val Ala Arg His Leu Val 1410 1415 1420 | 4272 |
| gcg gag cgc ggt gtc cgc cgc ctg gtg ctc gcg ggg cga cgc ggc tgg Ala Glu Arg Gly Val Arg Arg Leu Val Leu Ala Gly Arg Arg Gly Trp 1425 1430 1435 1440 | 4320 |
| agc gcc ccc ggg gtc acc gac ctg gtg gat gag ttg gtg ggc ctg gga Ser Ala Pro Gly Val Thr Asp Leu Val Asp Glu Leu Val Gly Leu Gly 1445 1450 1455 | 4368 |
| gct gcg gtc gag gtg gcg agc tgc gat gtc ggg gat cgg gcc cag ttg Ala Ala Val Glu Val Ala Ser Cys Asp Val Gly Asp Arg Ala Gln Leu 1460 1465 1470 | 4416 |
| gac cgg ctg ctg acg acg atc tcg gca gag ttc ccg ctg cgc gga gtg Asp Arg Leu Leu Thr Thr Ile Ser Ala Glu Phe Pro Leu Arg Gly Val 1475 1480 1485 | 4464 |
| gtg cat gcg gcc ggg gca ctt gcc gac ggg gtc gtc gag tcg ctg aca Val His Ala Ala Gly Ala Leu Ala Asp Gly Val Val Glu Ser Leu Thr 1490 1495 1500 | 4512 |

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|---|------|------|--|------|------|
| 1490 | | 1495 | | 1500 | |
| cca gag cac gtg gca aag gtg ttc ggc ccg aag gcc gcc ggt gcg tgg | 4560 | | | | |
| Pro Glu His Val Ala Lys Val Phe Gly Pro Lys Ala Ala Gly Ala Trp | | | | | |
| 1505 | | 1510 | | 1515 | 1520 |
| cac ctg cac gag ttg act ctt gat ctg gat ctc tcg ttc ttc gtg ctc | 4608 | | | | |
| His Leu His Glu Leu Thr Leu Asp Leu Asp Leu Ser Phe Phe Val Leu | | | | | |
| | | 1525 | | 1530 | 1535 |
| ttc tcc tcg ttc tcc ggc gtg gcg ggg gct gcg ggt cag gga aac tac | 4656 | | | | |
| Phe Ser Ser Phe Ser Gly Val Ala Gly Ala Ala Gly Gln Gly Asn Tyr | | | | | |
| | | 1540 | | 1545 | 1550 |
| gcg gcg gcg aac gcg ttc ctg gac ggc ctg gct cag cac cgg cgg acg | 4704 | | | | |
| Ala Ala Ala Asn Ala Phe Leu Asp Gly Leu Ala Gln His Arg Arg Thr | | | | | |
| | | 1555 | | 1560 | 1565 |
| gcg ggg ctg cct gcg gtg tcg ctg gct tgg ggc ttg tgg gag cag ccc | 4752 | | | | |
| Ala Gly Leu Pro Ala Val Ser Leu Ala Trp Gly Leu Trp Glu Gln Pro | | | | | |
| | | 1570 | | 1575 | 1580 |
| agc ggg atg acc gga gcg ctc gat gcg gcg ggc cgt agc cgc att gcg | 4800 | | | | |
| Ser Gly Met Thr Gly Ala Leu Asp Ala Ala Gly Arg Ser Arg Ile Ala | | | | | |
| | | 1585 | | 1590 | 1600 |
| cgc acc aat ccg ccg atg tcc gcg ccg gac ggg ttg cgg ctg ttc gag | 4848 | | | | |
| Arg Thr Asn Pro Pro Met Ser Ala Pro Asp Gly Leu Arg Leu Phe Glu | | | | | |
| | | 1605 | | 1610 | 1615 |
| atg gcg ttt cgc gtt ccg ggc gaa tcg ctt ctg gtt ccg gtc cac gtc | 4896 | | | | |
| Met Ala Phe Arg Val Pro Gly Glu Ser Leu Leu Val Pro Val His Val | | | | | |
| | | 1620 | | 1625 | 1630 |
| gac ctg aac gcc ctg cgc gct gat gcg gcc gac ggc ggt gtg cct gcg | 4944 | | | | |
| Asp Leu Asn Ala Leu Arg Ala Asp Ala Ala Asp Gly Gly Val Pro Ala | | | | | |
| | | 1635 | | 1640 | 1645 |
| ttg ttg cgc gac ctg gtg cca gcg ccc gtg cgg cgg agc gcg gtc aac | 4992 | | | | |
| Leu Leu Arg Asp Leu Val Pro Ala Pro Val Arg Arg Ser Ala Val Asn | | | | | |
| | | 1650 | | 1655 | 1660 |
| gag tcg gcg gac gtc aac ggt ctg gtt ggt cgg ctg cgg agg ctg ccg | 5040 | | | | |
| Glu Ser Ala Asp Val Asn Gly Leu Val Gly Arg Leu Arg Arg Leu Pro | | | | | |
| | | 1665 | | 1670 | 1675 |
| gac ctg gat cag gaa acc cag ctg ttg ggt ttg gtg cgc gag cat gtt | 5088 | | | | |
| Asp Leu Asp Gln Thr Gln Leu Leu Gly Leu Val Arg Glu His Val | | | | | |
| | | 1685 | | 1690 | 1695 |
| tcg gcg gtg ctg ggg cat tcg ggt gcg gtc gag gtc ggg gcc gat cgt | 5136 | | | | |
| Ser Ala Val Leu Gly His Ser Gly Ala Val Glu Val Gly Ala Asp Arg | | | | | |
| | | 1700 | | 1705 | 1710 |
| gct ttc cgg gat ttg ggt ttt gat tcg ttg tcc ggt gtg gag ttt cgg | 5184 | | | | |
| Ala Phe Arg Asp Leu Gly Phe Asp Ser Leu Ser Gly Val Glu Phe Arg | | | | | |
| | | 1715 | | 1720 | 1725 |
| aac cgg ctt ggc ggg gtg ctg ggc gtt cgg ttg ccg gct act gcg gtg | 5232 | | | | |
| Asn Arg Leu Gly Gly Val Leu Gly Val Arg Leu Pro Ala Thr Ala Val | | | | | |
| | | 1730 | | 1735 | 1740 |
| ttc gac tat ccg aca ccg cgg gcg ttg gtt cgg ttc ttg ctc gac aaa | 5280 | | | | |

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|------|------|------|------|-----|------|------|------|------|------|------|------|------|------|------|------|------|
| Phe | Asp | Tyr | Pro | Thr | Pro | Arg | Ala | Leu | Val | Arg | Phe | Leu | Leu | Asp | Lys | |
| 1745 | | | | | 1750 | | | | | 1755 | | | | | 1760 | |
| ctg | att | ggt | ggc | gtg | gag | gct | ccg | act | ccc | gca | ccg | gcg | gct | gtg | gcg | 5328 |
| Leu | Ile | Gly | Gly | Val | Glu | Ala | Pro | Thr | Pro | Ala | Pro | Ala | Ala | Val | Ala | |
| | | | 1765 | | | | | | 1770 | | | | | 1775 | | |
| gcg | gtg | act | gct | gac | gat | ccc | ggt | gtg | atc | gtg | ggg | atg | ggc | tgt | cgt | 5376 |
| Ala | Val | Thr | Ala | Asp | Asp | Pro | Val | Val | Ile | Val | Gly | Met | Gly | Cys | Arg | |
| | | | 1780 | | | | | 1785 | | | | | 1790 | | | |
| tat | ccg | ggt | ggg | gtg | tcc | tcg | ccg | gag | gag | ctt | tgg | cgt | ttg | gtg | gcc | 5424 |
| Tyr | Pro | Gly | Gly | Val | Ser | Ser | Pro | Glu | Glu | Leu | Trp | Arg | Leu | Val | Ala | |
| | | 1795 | | | | | 1800 | | | | | 1805 | | | | |
| ggg | ggc | ttg | gat | gcg | gtg | gcg | gag | ttc | ccg | gac | gat | cgt | ggc | tgg | gat | 5472 |
| Gly | Gly | Leu | Asp | Ala | Val | Ala | Glu | Phe | Pro | Asp | Asp | Arg | Gly | Trp | Asp | |
| | 1810 | | | | | 1815 | | | | 1820 | | | | | | |
| cag | gcg | ggg | ttg | ttc | gat | ccg | gat | ccc | gat | cgt | ctt | ggg | acc | tcg | tat | 5520 |
| Gln | Ala | Gly | Leu | Phe | Asp | Pro | Asp | Pro | Asp | Arg | Leu | Gly | Thr | Ser | Tyr | |
| | 1825 | | | | 1830 | | | | 1835 | | | | | | 1840 | |
| gtg | tgt | gag | ggt | ggc | ttc | ctg | cga | gat | gcg | gca | gag | ttc | gat | gcc | ggt | 5568 |
| Val | Cys | Glu | Gly | Gly | Phe | Leu | Arg | Asp | Ala | Ala | Glu | Phe | Asp | Ala | Gly | |
| | | | 1845 | | | | | 1850 | | | | | | 1855 | | |
| ttc | ttc | ggg | att | tcc | ccg | cgt | gag | gcg | ttg | gcg | atg | gat | ccg | cag | cag | 5616 |
| Phe | Phe | Gly | Ile | Ser | Pro | Arg | Glu | Ala | Leu | Ala | Met | Asp | Pro | Gln | Gln | |
| | | 1860 | | | | | | 1865 | | | | | 1870 | | | |
| cgg | ttg | ctg | ctg | gaa | gtc | gct | tgg | gaa | acc | gtg | gag | cgg | gcg | ggg | att | 5664 |
| Arg | Leu | Leu | Leu | Glu | Val | Ala | Trp | Glu | Thr | Val | Glu | Arg | Ala | Gly | Ile | |
| | 1875 | | | | | | 1880 | | | | | 1885 | | | | |
| gat | ccg | ctt | tcg | ttg | cgg | ggg | agc | cgg | acc | ggc | gtg | ttc | gcg | ggg | ctg | 5712 |
| Asp | Pro | Leu | Ser | Leu | Arg | Gly | Ser | Arg | Thr | Gly | Val | Phe | Ala | Gly | Leu | |
| | 1890 | | | | | 1895 | | | | 1900 | | | | | | |
| atg | cac | cac | gac | tac | ggc | gcg | cgg | ttc | atc | acg | agg | gcg | ccg | gag | ggt | 5760 |
| Met | His | His | Asp | Tyr | Gly | Ala | Arg | Phe | Ile | Thr | Arg | Ala | Pro | Glu | Gly | |
| | 1905 | | | | 1910 | | | | 1915 | | | | | | 1920 | |
| ttc | gag | ggt | tat | cta | ggt | aat | ggc | agc | gcg | gga | ggc | gtg | ttt | tcg | ggt | 5808 |
| Phe | Glu | Gly | Tyr | Leu | Gly | Asn | Gly | Ser | Ala | Gly | Gly | Val | Phe | Ser | Gly | |
| | | | 1925 | | | | | | 1930 | | | | | 1935 | | |
| cgg | ggt | gcg | tat | tcg | ttt | ggt | ttc | gag | ggt | cct | gcg | gtg | acg | gtg | gat | 5856 |
| Arg | Val | Ala | Tyr | Ser | Phe | Gly | Phe | Glu | Gly | Pro | Ala | Val | Thr | Val | Asp | |
| | | 1940 | | | | | 1945 | | | | | 1950 | | | | |
| acg | gcg | tgt | tcg | tcg | tcg | ttg | gtg | gcg | ctg | cac | ctg | gcg | ggt | caa | gca | 5904 |
| Thr | Ala | Cys | Ser | Ser | Ser | Leu | Val | Ala | Leu | His | Leu | Ala | Gly | Gln | Ala | |
| | | 1955 | | | | | 1960 | | | | | 1965 | | | | |
| ctg | cgg | tct | ggt | gag | tgt | gat | ctg | gct | ctt | gcg | ggt | ggt | gtg | acg | gtg | 5952 |
| Leu | Arg | Ser | Gly | Glu | Cys | Asp | Leu | Ala | Leu | Ala | Gly | Gly | Val | Thr | Val | |
| | 1970 | | | | | 1975 | | | | | 1980 | | | | | |
| atg | gcc | acg | ccg | ggg | atg | ttc | gtg | gag | ttt | tcg | cgt | caa | cgg | ggc | ttg | 6000 |
| Met | Ala | Thr | Pro | Gly | Met | Phe | Val | Glu | Phe | Ser | Arg | Gln | Arg | Gly | Leu | |
| | 1985 | | | | 1990 | | | | | 1995 | | | | | 2000 | |

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|---|------|
| gcg gcg gat ggg cgg tgc aag tcg ttt gcg gcg gct gcg gat ggc acc Ala Ala Asp Gly Arg Cys Lys Ser Phe Ala Ala Ala Asp Gly Thr 2005 2010 2015 | 6048 |
| ggt tgg gga gaa ggc gcg ggc ttg gtg ttg ttg gag cgg ctg tcg gat Gly Trp Gly Glu Gly Ala Gly Leu Val Leu Leu Glu Arg Leu Ser Asp 2020 2025 2030 | 6096 |
| gcc cgg cgc aac ggg cac gcg gtt ctg gcg gtc gtg cgg ggt agc gcg Ala Arg Arg Asn Gly His Ala Val Leu Ala Val Val Arg Gly Ser Ala 2035 2040 2045 | 6144 |
| gtg aat cag gat ggt gcg tcg aat ggt ttg acg gcg ccg aat ggg ccc Val Asn Gln Asp Gly Ala Ser Asn Gly Leu Thr Ala Pro Asn Gly Pro 2050 2055 2060 | 6192 |
| tcg cag cag cgg gtg atc acg cag gcg ttg gcg agt gct ggt ttg tcg Ser Gln Gln Arg Val Ile Thr Gln Ala Leu Ala Ser Ala Gly Leu Ser 2065 2070 2075 2080 | 6240 |
| gtg tct gat gtg gac gcc gtg gag gcg cat ggg act gga acc agg ctt Val Ser Asp Val Asp Ala Val Glu Ala His Gly Thr Gly Thr Arg Leu 2085 2090 2095 | 6288 |
| ggt gat ccg att gag gcg cag gct ctg att gcc act tac ggg cag ggg Gly Asp Pro Ile Glu Ala Gln Ala Leu Ile Ala Thr Tyr Gly Gln Gly 2100 2105 2110 | 6336 |
| cgg gat agc gat cgg ccg ttg tgg ttg ggg tcg gtg aag tcg aat att Arg Asp Ser Asp Arg Pro Leu Trp Leu Gly Ser Val Lys Ser Asn Ile 2115 2120 2125 | 6384 |
| ggt cat acg cag gcg gcg gcg ggt gtc gct ggt gtg atc aag atg gtg Gly His Thr Gln Ala Ala Ala Gly Val Ala Gly Val Ile Lys Met Val 2130 2135 2140 | 6432 |
| atg gcg atg cgg cac ggg cag ctg ccc gcg acg ttg cat gtg gat gaa Met Ala Met Arg His Gly Gln Leu Pro Ala Thr Leu His Val Asp Glu 2145 2150 2155 2160 | 6480 |
| cct acg tcg gaa gtg gat tgg tcg gcg ggg gat gtc cag ctc ctc acg Pro Thr Ser Glu Val Asp Trp Ser Ala Gly Asp Val Gln Leu Leu Thr 2165 2170 2175 | 6528 |
| gag aac acc ccc tgg ccc ggc aac agc cat cct cgg cgg gtg ggc gtg Glu Asn Thr Pro Trp Pro Gly Asn Ser His Pro Arg Arg Val Gly Val 2180 2185 2190 | 6576 |
| tcg tcg ttc ggg atc agc ggc acc aac gca cac gtc atc ctc gaa caa Ser Ser Phe Gly Ile Ser Gly Thr Asn Ala His Val Ile Leu Glu Gln 2195 2200 2205 | 6624 |
| gcc tcg aaa aca cca gac gag act gcg gac aag agc ggt ccc gat tcg Ala Ser Lys Thr Pro Asp Glu Thr Ala Asp Lys Ser Gly Pro Asp Ser 2210 2215 2220 | 6672 |
| gaa tcg acc gtg gac ctt cca gcg gtc ccg ttg atc gtg tcg ggg aga Glu Ser Thr Val Asp Leu Pro Ala Val Pro Leu Ile Val Ser Gly Arg 2225 2230 2235 2240 | 6720 |
| aca ccg gca gcg ctc agc gct cag gcg agc gca ttg ttg tcc tat ttg Thr Pro Ala Ala Leu Ser Ala Gln Ala Ser Ala Leu Leu Ser Tyr Leu 2245 2250 2255 | 6768 |

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|---|------|
| ggt gag cgt ggc gat att tcc acg ctg gat gcg gcg ttt tcg ttg gct Gly Glu Arg Gly Asp Ile Ser Thr Leu Asp Ala Ala Phe Ser Leu Ala 2260 2265 2270 | 6816 |
| tcc tcc cgg gcc gcg ttg gag gag cgg gcg gtg gtg ctg gga gcg gac Ser Ser Arg Ala Ala Leu Glu Glu Arg Ala Val Val Leu Gly Ala Asp 2275 2280 2285 | 6864 |
| cgc gaa acg ttg ttg tcc ggg ttg gaa gcg ctg gct tcc ggt cgc gag Arg Glu Thr Leu Leu Ser Gly Leu Glu Ala Leu Ala Ser Gly Arg Glu 2290 2295 2300 | 6912 |
| gct tct ggg gtg gtg tcg gga tcc ccg gtc tct ggc ggg gtt ggg ttc Ala Ser Gly Val Val Ser Gly Ser Pro Val Ser Gly Gly Val Gly Phe 2305 2310 2315 2320 | 6960 |
| gtg ttc gcc ggt cag ggc gga cag tgg ttg ggg atg ggc cgg ggg ctc Val Phe Ala Gly Gln Gly Gly Gln Trp Leu Gly Met Gly Arg Gly Leu 2325 2330 2335 | 7008 |
| tac tcg gtt ttt ccg gtg ttc gct gac gcg ttt gac gaa gca tgt gcc Tyr Ser Val Phe Pro Val Phe Ala Asp Ala Phe Asp Glu Ala Cys Ala 2340 2345 2350 | 7056 |
| gga ctg gac gcg cat ctg ggg cag gac gtg ggg gtc cgg gat gtg gtg Gly Leu Asp Ala His Leu Gly Gln Asp Val Gly Val Arg Asp Val Val 2355 2360 2365 | 7104 |
| ttt ggt tcc gac ggg tcc ttg ttg gat cgg acg ctg tgg gcc cag tcg Phe Gly Ser Asp Gly Ser Leu Leu Asp Arg Thr Leu Trp Ala Gln Ser 2370 2375 2380 | 7152 |
| ggt ttg ttc gcg ttg cag gtt ggt ttg ctg agc ctg ctg ggt tcg tgg Gly Leu Phe Ala Leu Gln Val Gly Leu Leu Ser Leu Leu Gly Ser Trp 2385 2390 2395 2400 | 7200 |
| ggt gtc cgg ccg ggt gtg gtg ctg ggc cat tcg gtc ggc gag ttc gcg Gly Val Arg Pro Gly Val Val Leu Gly His Ser Val Gly Glu Phe Ala 2405 2410 2415 | 7248 |
| gcg gcg gtt gcg gcg gga gtg ttg tcg ttg ccg gat gcg gct cgg atg Ala Ala Val Ala Ala Gly Val Leu Ser Leu Pro Asp Ala Ala Arg Met 2420 2425 2430 | 7296 |
| gtg gcg ggt cgt gcc cgg ttg atg cag gcg ttg cct tct ggc ggt gcc Val Ala Gly Arg Ala Arg Leu Met Gln Ala Leu Pro Ser Gly Gly Ala 2435 2440 2445 | 7344 |
| atg ttg gcg gtg gct gct ggt gag gag cag ctg cgg ccg ttg ttg gcc Met Leu Ala Val Ala Ala Gly Glu Glu Gln Leu Arg Pro Leu Leu Ala 2450 2455 2460 | 7392 |
| gat cgg gtt gat ggt gcg ggt atc gcc gcg gtc aac gct cct gag tcg Asp Arg Val Asp Gly Ala Gly Ile Ala Ala Val Asn Ala Pro Glu Ser 2465 2470 2475 2480 | 7440 |
| gtg gtg ctc tcc ggc gat cgg gag gtg ctt gac gac atc gcc ggc gcg Val Val Leu Ser Gly Asp Arg Glu Val Leu Asp Asp Ile Ala Gly Ala 2485 2490 2495 | 7488 |
| ctg gat ggg caa ggg att cgg tgg cgg cgg ttg cgg gtt tcg cat gcg Leu Asp Gly Gln Gly Ile Arg Trp Arg Arg Leu Arg Val Ser His Ala 2500 2505 2510 | 7536 |

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| 2500 | 2505 | 2510 | |
|---|------|------|------|
| ttt cat tcg tat cgg atg gac ccg atg ttg cag gag ttc gcc gaa atc Phe His Ser Tyr Arg Met Asp Pro Met Leu Gln Glu Phe Ala Glu Ile 2515 2520 2525 | | | 7584 |
| gca cgc agc gtg gac tac cgg cgt ggc gac cta ccg gtc gtg tcg acg Ala Arg Ser Val Asp Tyr Arg Arg Gly Asp Leu Pro Val Val Ser Thr 2530 2535 2540 | | | 7632 |
| ttg acg ggt gag ctc gac acc gca ggt gtg atg gct acg ccg gag tat Leu Thr Gly Glu Leu Asp Thr Ala Gly Val Met Ala Thr Pro Glu Tyr 2545 2550 2555 2560 | | | 7680 |
| tgg gtg cgt cag gtt cga gag ccc gtc cgc ttc gcc gac ggc gtc cgg Trp Val Arg Gln Val Arg Glu Pro Val Arg Phe Ala Asp Gly Val Arg 2565 2570 2575 | | | 7728 |
| gtg ctc gcg cag caa ggg gtc gcc acg atc ttc gaa ctc ggc cct gat Val Leu Ala Gln Gln Gly Val Ala Thr Ile Phe Glu Leu Gly Pro Asp 2580 2585 2590 | | | 7776 |
| gcg acg ctg tcg gcc ctg att ccc gat tgt cat tcg tgg gct gat cag Ala Thr Leu Ser Ala Leu Ile Pro Asp Cys His Ser Trp Ala Asp Gln 2595 2600 2605 | | | 7824 |
| gcc atg ccg att ccg atg ctg cgt aaa gac cgt acg gaa acc gaa act Ala Met Pro Ile Pro Met Leu Arg Lys Asp Arg Thr Glu Thr Glu Thr 2610 2615 2620 | | | 7872 |
| gtg gtc gcc gcg gtg gcg cgg gcg cac acg cgt ggt gtt ccg gtc gaa Val Val Ala Ala Val Ala Arg Ala His Thr Arg Gly Val Pro Val Glu 2625 2630 2635 2640 | | | 7920 |
| tgg tcg gcg tat ttc gcc ggc acc ggg gca ccg ccg gtc gag ttg ccg Trp Ser Ala Tyr Phe Ala Gly Thr Gly Ala Arg Arg Val Glu Leu Pro 2645 2650 2655 | | | 7968 |
| acg tat gcc ttc cag cgg cag cgg tac tgg ctg gaa aca tcg gat tac Thr Tyr Ala Phe Gln Arg Gln Arg Tyr Trp Leu Glu Thr Ser Asp Tyr 2660 2665 2670 | | | 8016 |
| ggc gat gtg acg ggt atc ggc ctg gct gcg gcg gag cat ccg ttg ctg Gly Asp Val Thr Gly Ile Gly Leu Ala Ala Ala Glu His Pro Leu Leu 2675 2680 2685 | | | 8064 |
| ggg gcc gtg gtt gcg ctg gcc gat ggt gat ggg atg gtg ctg acc ggc Gly Ala Val Val Ala Leu Ala Asp Gly Asp Gly Met Val Leu Thr Gly 2690 2695 2700 | | | 8112 |
| cgg ttg tcg gtg ggg acg cat ccg tgg ctg gcc cag cat cgc gtg ctg Arg Leu Ser Val Gly Thr His Pro Trp Leu Ala Gln His Arg Val Leu 2705 2710 2715 2720 | | | 8160 |
| ggc gag gtc gtc gtc ccc ggc acc gcc atc ctg gag atg gcc ctg cac Gly Glu Val Val Val Pro Gly Thr Ala Ile Leu Glu Met Ala Leu His 2725 2730 2735 | | | 8208 |
| gca ggg gcg cgt ctc ggc tgt gac cgg gtg gaa gag ctc acc ctg gaa Ala Gly Ala Arg Leu Gly Cys Asp Arg Val Glu Glu Leu Thr Leu Glu 2740 2745 2750 | | | 8256 |
| aca ccg ctg gtg gtc ccc gaa cgc gcg gcg ggt gcc ggt agt cgt ggc | | | 8304 |

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|-----|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|--|
| Thr | Pro | Leu | Val | Val | Pro | Glu | Arg | Ala | Ala | Gly | Ala | Gly | Ser | Arg | Gly | | |
| | | 2755 | | | | | 2760 | | | | | 2765 | | | | | |
| cct | gcg | gga | ggg | acc | aca | gtt | tca | att | gaa | act | gcg | gaa | gaa | cgt | gtg | 8352 | |
| Pro | Ala | Gly | Gly | Thr | Thr | Val | Ser | Ile | Glu | Thr | Ala | Glu | Glu | Arg | Val | | |
| | 2770 | | | | | 2775 | | | | | 2780 | | | | | | |
| cgg | acg | aac | gac | gcc | atc | gaa | atc | cag | ctg | ctg | gtg | aac | gca | ccc | gac | 8400 | |
| Arg | Thr | Asn | Asp | Ala | Ile | Glu | Ile | Gln | Leu | Leu | Val | Asn | Ala | Pro | Asp | | |
| | | | | | 2790 | | | | | 2795 | | | | | 2800 | | |
| gaa | ggc | ggt | cgg | cga | agg | gtg | tcg | ctg | tat | tcc | cgc | ccg | gcc | ggt | ggg | 8448 | |
| Glu | Gly | Gly | Arg | Arg | Arg | Val | Ser | Leu | Tyr | Ser | Arg | Pro | Ala | Gly | Gly | | |
| | | | | | 2805 | | | | 2810 | | | | | 2815 | | | |
| tcg | aga | ggt | ggg | ggt | tgg | acg | cgc | cac | gcc | acc | ggc | gaa | ctc | gtc | gtc | 8496 | |
| Ser | Arg | Gly | Gly | Gly | Trp | Thr | Arg | His | Ala | Thr | Gly | Glu | Leu | Val | Val | | |
| | | 2820 | | | | | | 2825 | | | | 2830 | | | | | |
| ggc | acc | acc | ggt | ggt | agg | gcg | gtt | cct | gat | tgg | tcg | gct | gag | ggt | gcc | 8544 | |
| Gly | Thr | Thr | Gly | Gly | Arg | Ala | Val | Pro | Asp | Trp | Ser | Ala | Glu | Gly | Ala | | |
| | | 2835 | | | | | 2840 | | | | | 2845 | | | | | |
| gag | tcg | att | gct | ctc | gat | gag | ttc | tac | gtc | gct | ctg | gcc | gga | aac | ggg | 8592 | |
| Glu | Ser | Ile | Ala | Leu | Asp | Glu | Phe | Tyr | Val | Ala | Leu | Ala | Gly | Asn | Gly | | |
| | 2850 | | | | | 2855 | | | | 2860 | | | | | | | |
| ttc | gag | tac | ggg | ccg | ttg | ttc | cag | ggg | ctt | cag | gcg | gca | tgg | cgt | cgt | 8640 | |
| Phe | Glu | Tyr | Gly | Pro | Leu | Phe | Gln | Gly | Leu | Gln | Ala | Ala | Trp | Arg | Arg | | |
| | 2865 | | | | 2870 | | | | 2875 | | | | | | 2880 | | |
| ggt | gac | gag | gtt | ctc | gcc | gaa | atc | gcc | ccg | ccg | gcc | gag | gcc | gat | gcg | 8688 | |
| Gly | Asp | Glu | Val | Leu | Ala | Glu | Ile | Ala | Pro | Pro | Ala | Glu | Ala | Asp | Ala | | |
| | | | | 2885 | | | | | 2890 | | | | | 2895 | | | |
| atg | gcg | tcg | gga | tac | ctg | ctc | gac | cca | gcg | ttg | ctg | gat | gcc | gcg | ctg | 8736 | |
| Met | Ala | Ser | Gly | Tyr | Leu | Leu | Asp | Pro | Ala | Leu | Leu | Asp | Ala | Ala | Leu | | |
| | | 2900 | | | | | | 2905 | | | | | 2910 | | | | |
| cag | gcg | tcc | gcg | ctc | ggc | gac | cgc | ccg | gag | caa | ggc | ggc | gcg | tgg | ctg | 8784 | |
| Gln | Ala | Ser | Ala | Leu | Gly | Asp | Arg | Pro | Glu | Gln | Gly | Gly | Ala | Trp | Leu | | |
| | 2915 | | | | | | 2920 | | | | | 2925 | | | | | |
| ccg | ttc | tca | ttc | acc | ggc | gtc | gaa | ctt | tcc | gct | ccg | gca | ggg | acg | atc | 8832 | |
| Pro | Phe | Ser | Phe | Thr | Gly | Val | Glu | Leu | Ser | Ala | Pro | Ala | Gly | Thr | Ile | | |
| | 2930 | | | | | 2935 | | | | | 2940 | | | | | | |
| agc | agg | gtg | cgg | ctg | gag | acc | agg | cga | ccc | gac | gcg | ata | tcg | gtg | gcc | 8880 | |
| Ser | Arg | Val | Arg | Leu | Glu | Thr | Arg | Arg | Pro | Asp | Ala | Ile | Ser | Val | Ala | | |
| | 2945 | | | | 2950 | | | | | 2955 | | | | | 2960 | | |
| gtg | atg | gat | gag | agt | ggg | cgg | ttg | ctc | gcc | tcg | atc | gat | tct | ctc | agg | 8928 | |
| Val | Met | Asp | Glu | Ser | Gly | Arg | Leu | Leu | Ala | Ser | Ile | Asp | Ser | Leu | Arg | | |
| | | | | 2965 | | | | | 2970 | | | | | 2975 | | | |
| cta | cga | agc | gtg | tcg | tcg | gga | cag | ctg | gcg | aat | cgg | gac | gct | gtc | cgc | 8976 | |
| Leu | Arg | Ser | Val | Ser | Ser | Gly | Gln | Leu | Ala | Asn | Arg | Asp | Ala | Val | Arg | | |
| | | | 2980 | | | | | 2985 | | | | | 2990 | | | | |
| gac | gcg | ctg | ttc | gag | gtg | acc | tgg | gag | ccg | gtg | gcg | acg | cag | tcg | acg | 9024 | |
| Asp | Ala | Leu | Phe | Glu | Val | Thr | Trp | Glu | Pro | Val | Ala | Thr | Gln | Ser | Thr | | |
| | 2995 | | | | | | 3000 | | | | | 3005 | | | | | |

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|---|------|
| gaa ccg ggt cgc tgg gcc ctg ctt ggt gat act gcc tgc ggt aaa gac Glu Pro Gly Arg Trp Ala Leu Leu Gly Asp Thr Ala Cys Gly Lys Asp 3010 3015 3020 | 9072 |
| gat ctg atc aaa ctg gca acg gat tcc gcc gac cgc tgc gcg gat ctg Asp Leu Ile Lys Leu Ala Thr Asp Ser Ala Asp Arg Cys Ala Asp Leu 3025 3030 3035 3040 | 9120 |
| gcg gcg cta gcc gag aaa ctt gat tcc agc gcg ctg gtt cct gat gtc Ala Ala Leu Ala Glu Lys Leu Asp Ser Ser Ala Leu Val Pro Asp Val 3045 3050 3055 | 9168 |
| gtg gtc tac tgc gcc gga gaa cag gcg gat ccc ggc acc ggc gca gcc Val Val Tyr Cys Ala Gly Glu Gln Ala Asp Pro Gly Thr Gly Ala Ala 3060 3065 3070 | 9216 |
| gca ctt gcg gag acc cag cag acg ttg gct ctg ctg caa gcg tgg ttg Ala Leu Ala Glu Thr Gln Gln Thr Leu Ala Leu Leu Gln Ala Trp Leu 3075 3080 3085 | 9264 |
| gct gag ccg cgg ttg gcc gag gca cgt ctg gtg gtg gtg acg tgt gca Ala Glu Pro Arg Leu Ala Glu Ala Arg Leu Val Val Val Thr Cys Ala 3090 3095 3100 | 9312 |
| gcg gtg acg acg gct ccg agt gac ggt gca tca gag ctg gca cat gcg Ala Val Thr Thr Ala Pro Ser Asp Gly Ala Ser Glu Leu Ala His Ala 3105 3110 3115 3120 | 9360 |
| ccg ttg tgg ggg ttg ttg cgt gcc gcg cag gtg gag aac ccg ggg cag Pro Leu Trp Gly Leu Leu Arg Ala Ala Gln Val Glu Asn Pro Gly Gln 3125 3130 3135 | 9408 |
| ttt gtg ctg gcg gac gtc gac gga acc gcc gaa tcg tgg cgt gcg ttg Phe Val Leu Ala Asp Val Asp Gly Thr Ala Glu Ser Trp Arg Ala Leu 3140 3145 3150 | 9456 |
| ccg agt gcg ttg ggc tcg atg gaa ccg cag ttg gcc ctg cgg aag ggc Pro Ser Ala Leu Gly Ser Met Glu Pro Gln Leu Ala Leu Arg Lys Gly 3155 3160 3165 | 9504 |
| gcg gtg cga gcg ccc cgc ttg gct tcg gtc gcc ggg cag atc gac gtg Ala Val Arg Ala Pro Arg Leu Ala Ser Val Ala Gly Gln Ile Asp Val 3170 3175 3180 | 9552 |
| ccc gcg gtt gtg gcg gat ccc gac cga acc gtg ctg att tcg ggc ggc Pro Ala Val Val Ala Asp Pro Asp Arg Thr Val Leu Ile Ser Gly Gly 3185 3190 3195 3200 | 9600 |
| acg ggc ctg ttg ggg ggc gcg gtt gcc cgc cac ctg gtg acc gaa cgc Thr Gly Leu Leu Gly Gly Ala Val Ala Arg His Leu Val Thr Glu Arg 3205 3210 3215 | 9648 |
| ggt gtc cgc cga ttg gtg ttg acg ggc cgt cgt ggc tgg gat gct cct Gly Val Arg Arg Leu Val Leu Thr Gly Arg Arg Gly Trp Asp Ala Pro 3220 3225 3230 | 9696 |
| gga atc acc gag ttg gtg ggt gag ctg aac ggc ctg ggt gcc gtg gtc Gly Ile Thr Glu Leu Val Gly Glu Leu Asn Gly Leu Gly Ala Val Val 3235 3240 3245 | 9744 |
| gac gtg gtg gcg tgc gac gtc gcg gat cgt gct gat ctg gag tcg ttg Asp Val Val Ala Cys Asp Val Ala Asp Arg Ala Asp Leu Glu Ser Leu 3250 3255 3260 | 9792 |

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|---|-------|
| ctg gcg gcg gtc ccg gcg gaa ttt ccg ttg tgc ggc gtg gtg cat gcc Leu Ala Ala Val Pro Ala Glu Phe Pro Leu Cys Gly Val Val His Ala 3265 3270 3275 3280 | 9840 |
| gcg ggg gcg ctg gcc gac ggg gtg atc gag tgc ttg tca ccg gac gac Ala Gly Ala Leu Ala Asp Gly Val Ile Glu Ser Leu Ser Pro Asp Asp 3285 3290 3295 | 9888 |
| gtg gga gcg gtg ttc ggc ccg aag gcg gcg ggg gcg tgg aat ctg cac Val Gly Ala Val Phe Gly Pro Lys Ala Ala Gly Ala Trp Asn Leu His 3300 3305 3310 | 9936 |
| gag ctg act cgt gat acg gac ctg tgc ttc ttc gcg ttg ttc tcc tgc Glu Leu Thr Arg Asp Thr Asp Leu Ser Phe Phe Ala Leu Phe Ser Ser 3315 3320 3325 | 9984 |
| ctt tcc ggt gtt gcc ggc gct cct ggt cag ggc aat tat gcg gcg gcg Leu Ser Gly Val Ala Gly Ala Pro Gly Gln Gly Asn Tyr Ala Ala Ala 3330 3335 3340 | 10032 |
| aac gcg ttc ctg gac gca ttg gcg cat tac cgg cgg tca cag gga ctg Asn Ala Phe Leu Asp Ala Leu Ala His Tyr Arg Arg Ser Gln Gly Leu 3345 3350 3355 3360 | 10080 |
| cct gcg gtg tgc ctg gcc tgg ggc ctg tgg gag cag ccg agc ggg atg Pro Ala Val Ser Leu Ala Trp Gly Leu Trp Glu Gln Pro Ser Gly Met 3365 3370 3375 | 10128 |
| acg gag acg ctc agc gag gtc gac cgg agc agg atc gcg cgc gcc aac Thr Glu Thr Leu Ser Glu Val Asp Arg Ser Arg Ile Ala Arg Ala Asn 3380 3385 3390 | 10176 |
| ccg ccg ttg tcc acc aag gag gga ttg cgg ctg ttc gat gcc ggg ctg Pro Pro Leu Ser Thr Lys Glu Gly Leu Arg Leu Phe Asp Ala Gly Leu 3395 3400 3405 | 10224 |
| gcg ctg gac cgg gca gcg gta gtt ccg gcg aag ttg gac agg act ttc Ala Leu Asp Arg Ala Ala Val Val Pro Ala Lys Leu Asp Arg Thr Phe 3410 3415 3420 | 10272 |
| ctg gcc gag cag gcg cgg tgc ggc tgc ctg ccc gca ttg ttg acg gca Leu Ala Glu Gln Ala Arg Ser Gly Ser Leu Pro Ala Leu Leu Thr Ala 3425 3430 3435 3440 | 10320 |
| ctg gta ccc ccc atc cgt cgt aat agg cgg gct agc gga acc gag ctc Leu Val Pro Pro Ile Arg Arg Asn Arg Arg Ala Ser Gly Thr Glu Leu 3445 3450 3455 | 10368 |
| gcg gac gag ggc acc ctg ctc ggg gtg gtg cgg gag cat gcc gcg gcc Ala Asp Glu Gly Thr Leu Leu Gly Val Val Arg Glu His Ala Ala Ala 3460 3465 3470 | 10416 |
| gtg ctg ggg tat tgc agc gcg gct gac gtc ggg gtc gag cgc gct ttc Val Leu Gly Tyr Ser Ser Ala Ala Asp Val Gly Val Glu Arg Ala Phe 3475 3480 3485 | 10464 |
| cgg gat ctg ggt ttt gat tgc ttg tct ggt gtg gag ttg cgg aac cgc Arg Asp Leu Gly Phe Asp Ser Leu Ser Gly Val Glu Leu Arg Asn Arg 3490 3495 3500 | 10512 |
| ctt gcc ggg gtg ctg ggg gtg cgg ttg ccg gcg act gcg gtg ttc gac Leu Ala Gly Val Leu Gly Val Arg Leu Pro Ala Thr Ala Val Phe Asp 3505 3510 3515 3520 | 10560 |

| 3505 | 3510 | LeA33955-US 3515 | 3520 | |
|---|------|---------------------|------|-------|
| tat ccg acg ccg agg gcg ctg gcc cgg ttc ctg cac cag gaa ctg gca | | | | 10608 |
| Tyr Pro Thr Pro Arg Ala Leu Ala Arg Phe Leu His Gln Glu Leu Ala | 3525 | 3530 | 3535 | |
| gac gag atc gct acg acg cca gcg ccg gtg acg acg acc agg gca ccg | | | | 10656 |
| Asp Glu Ile Thr Thr Pro Ala Pro Val Thr Thr Thr Arg Ala Pro | 3540 | 3545 | 3550 | |
| gtc gcc gaa gac gat ctc gtc gcg ata gtc ggg atg gga tgc cgt ttt | | | | 10704 |
| Val Ala Glu Asp Asp Leu Val Ala Ile Val Gly Met Gly Cys Arg Phe | 3555 | 3560 | 3565 | |
| ccc ggt cag gtg tcc tcg ccg gag gag ctc tgg cgt ttg gtg gcc ggg | | | | 10752 |
| Pro Gly Gln Val Ser Ser Pro Glu Glu Leu Trp Arg Leu Val Ala Gly | 3570 | 3575 | 3580 | |
| ggc gtg gat gcg gtc gcg gac ttc cca gcc gat cgc ggc tgg gat ctg | | | | 10800 |
| Gly Val Asp Ala Val Ala Asp Phe Pro Ala Asp Arg Gly Trp Asp Leu | 3585 | 3590 | 3595 | 3600 |
| gca ggc ttg ttc gat ccg gac ccg gaa cgg gct ggg aag acc tac gtg | | | | 10848 |
| Ala Gly Leu Phe Asp Pro Asp Pro Glu Arg Ala Gly Lys Thr Tyr Val | 3605 | 3610 | 3615 | |
| cgg gaa ggg gcc ttc ctc acc gac gcc gat cgg ttc gat gcg ggt ttc | | | | 10896 |
| Arg Glu Gly Ala Phe Leu Thr Asp Ala Asp Arg Phe Asp Ala Gly Phe | 3620 | 3625 | 3630 | |
| ttc ggg att tcc ccg cgt gag gcg ttg gcg atg gat ccg cag caa cgg | | | | 10944 |
| Phe Gly Ile Ser Pro Arg Glu Ala Leu Ala Met Asp Pro Gln Gln Arg | 3635 | 3640 | 3645 | |
| ctg ttg ctg gag ctg tcc tgg gag gcc att gaa cgg gca ggg atc gat | | | | 10992 |
| Leu Leu Leu Glu Leu Ser Trp Glu Ala Ile Glu Arg Ala Gly Ile Asp | 3650 | 3655 | 3660 | |
| ccg ggt tcg ctg agg ggg agt cgg acc ggt gtg ttc gcg ggg ctg atg | | | | 11040 |
| Pro Gly Ser Leu Arg Gly Ser Arg Thr Gly Val Phe Ala Gly Leu Met | 3665 | 3670 | 3675 | 3680 |
| tac cac gac tat ggc gcc cgg ttc gcc agc cga gcc ccg gaa ggt ttc | | | | 11088 |
| Tyr His Asp Tyr Gly Ala Arg Phe Ala Ser Arg Ala Pro Glu Gly Phe | 3685 | 3690 | 3695 | |
| gag ggg tat ctc ggc aat ggc agt gct ggg agt gtc gcg tcg ggc cgg | | | | 11136 |
| Glu Gly Tyr Leu Gly Asn Gly Ser Ala Gly Ser Val Ala Ser Gly Arg | 3700 | 3705 | 3710 | |
| att gcg tac tcg ttt ggt ttc gag ggt cct gcg gtg acg gtg gat act | | | | 11184 |
| Ile Ala Tyr Ser Phe Gly Phe Glu Gly Pro Ala Val Thr Val Asp Thr | 3715 | 3720 | 3725 | |
| gcg tgt tcg tcg tcg ttg gtg gcg ttg cat ttg gcg ggt cag tcg ttg | | | | 11232 |
| Ala Cys Ser Ser Ser Leu Val Ala Leu His Leu Ala Gly Gln Ser Leu | 3730 | 3735 | 3740 | |
| cgt tcc ggc gaa tgc gat ctc gcc ctt gcc ggt ggt gtg acg gtg atg | | | | 11280 |
| Arg Ser Gly Glu Cys Asp Leu Ala Leu Ala Gly Gly Val Thr Val Met | 3745 | 3750 | 3755 | 3760 |
| tcg acg ccc ggg acg ttt gtg gaa ttc tcc cgt cag cgg ggc ctg gca | | | | 11328 |

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|---|-----------------------------|--|
| Ser Thr Pro Gly Thr Phe Val Glu Phe | Ser Arg Gln Arg Gly Leu Ala | |
| 3765 | 3770 3775 | |
| ccg gac ggg cgg tgc aag tcg ttc gcg gag agc gcg gac ggt acc ggt | 11376 | |
| Pro Asp Gly Arg Cys Lys Ser Phe Ala Glu Ser Ala Asp Gly Thr Gly | | |
| 3780 | 3785 3790 | |
| tgg ggt gag ggt gct ggt ttg gtg ttg ttg gag cgg ttg tcg gat gct | 11424 | |
| Trp Gly Glu Gly Ala Gly Leu Val Leu Leu Glu Arg Leu Ser Asp Ala | | |
| 3795 | 3800 3805 | |
| cgg cgg aat ggg cat cgg gtg ttg gcg gtg gtt cgt ggg tcg gcg gtg | 11472 | |
| Arg Arg Asn Gly His Arg Val Leu Ala Val Val Arg Gly Ser Ala Val | | |
| 3810 | 3815 3820 | |
| aat cag gat ggt gcg tcg aat ggc ttg acc gcg ccg aat ggt ccc tcg | 11520 | |
| Asn Gln Asp Gly Ala Ser Asn Gly Leu Thr Ala Pro Asn Gly Pro Ser | | |
| 3825 | 3830 3835 3840 | |
| cag cag cgg gtc atc cag cag gcg ttg gcg agt gcg ggt ctg tcg gtg | 11568 | |
| Gln Gln Arg Val Ile Gln Gln Ala Leu Ala Ser Ala Gly Leu Ser Val | | |
| 3845 | 3850 3855 | |
| tcc gat gtg gat gcc gtg gag gcg cat ggg acc ggg acc agg ttg ggt | 11616 | |
| Ser Asp Val Asp Ala Val Glu Ala His Gly Thr Gly Thr Arg Leu Gly | | |
| 3860 | 3865 3870 | |
| gat ccg att gag gcg cag gct ctg att gct acg tat ggg cgc gat cgt | 11664 | |
| Asp Pro Ile Glu Ala Gln Ala Leu Ile Ala Thr Tyr Gly Arg Asp Arg | | |
| 3875 | 3880 3885 | |
| gat ccc ggt cgg ccg ttg tgg ttg ggg tcg gtg aag tcc aac atc ggt | 11712 | |
| Asp Pro Gly Arg Pro Leu Trp Leu Gly Ser Val Lys Ser Asn Ile Gly | | |
| 3890 | 3895 3900 | |
| cat acg cag gcg gcg gcg ggt gtt gcc ggt gtg atc aag atg gtg atg | 11760 | |
| His Thr Gln Ala Ala Ala Gly Val Ala Gly Val Ile Lys Met Val Met | | |
| 3905 | 3910 3915 3920 | |
| gcg atg cgg cac ggg caa ctt ccg cgc acg ctg cac gtg gat gca ccc | 11808 | |
| Ala Met Arg His Gly Gln Leu Pro Arg Thr Leu His Val Asp Ala Pro | | |
| 3925 | 3930 3935 | |
| tcc tcg cag gtg gat tgg tcg gcg ggg agg gtc cag ctc ctg acg gag | 11856 | |
| Ser Ser Gln Val Asp Trp Ser Ala Gly Arg Val Gln Leu Leu Thr Glu | | |
| 3940 | 3945 3950 | |
| aac acg ccc tgg ccc gac agt ggt cgc ccc tgt cgg gtg ggg gtg tcg | 11904 | |
| Asn Thr Pro Trp Pro Asp Ser Gly Arg Pro Cys Arg Val Gly Val Ser | | |
| 3955 | 3960 3965 | |
| tcg ttc ggg atc agc ggc acc aac gcg cac gtc atc ctg gaa cag tcc | 11952 | |
| Ser Phe Gly Ile Ser Gly Thr Asn Ala His Val Ile Leu Glu Gln Ser | | |
| 3970 | 3975 3980 | |
| acg ggg cag atg gat cag gca gcg gag ccg gat tcg agt cct gtt ctg | 12000 | |
| Thr Gly Gln Met Asp Gln Ala Ala Glu Pro Asp Ser Ser Pro Val Leu | | |
| 3985 | 3990 3995 4000 | |
| gat gtt ccg gtg gtg ccg tgg gtg gtg tcg ggc aaa aca ccc gaa gcg | 12048 | |
| Asp Val Pro Val Val Pro Trp Val Val Ser Gly Lys Thr Pro Glu Ala | | |
| 4005 | 4010 4015 | |

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| cta tcc gcc cag gcg gca acg ttg gcg acc tat ttg gac caa aat gtt Leu Ser Ala Gln Ala Ala Thr Leu Ala Thr Tyr Leu Asp Gln Asn Val 4020 4025 4030 | 12096 |
| gat gtc tcc cct ctg gac gtt ggg att tcg ctt gcg gtg acc cgt tcg Asp Val Ser Pro Leu Asp Val Gly Ile Ser Leu Ala Val Thr Arg Ser 4035 4040 4045 | 12144 |
| gcg ctg gat gag cgg gcg gtg gtg ctg ggg tcg gat cgt gac acg ttg Ala Leu Asp Glu Arg Ala Val Val Leu Gly Ser Asp Arg Asp Thr Leu 4050 4055 4060 | 12192 |
| ttg tct ggc ctg aat gcg ctg gct gcc ggt cat gag gct gct ggc gtg Leu Ser Gly Leu Asn Ala Leu Ala Ala Gly His Glu Ala Ala Gly Val 4065 4070 4075 4080 | 12240 |
| gtt acg gga cct gtc ggg att ggt ggc cgg acc ggg ttt gtg ttc gcc Val Thr Gly Pro Val Gly Ile Gly Gly Arg Thr Gly Phe Val Phe Ala 4085 4090 4095 | 12288 |
| ggt caa ggc ggt cag tgg ttg ggg atg ggc cgc cgg ttg tac tcg gag Gly Gln Gly Gly Gln Trp Leu Gly Met Gly Arg Arg Leu Tyr Ser Glu 4100 4105 4110 | 12336 |
| ttt ccg gcg ttc gcc ggt gct ttc gac gaa gca tgc gcc gag ctc gat Phe Pro Ala Phe Ala Gly Ala Phe Asp Glu Ala Cys Ala Glu Leu Asp 4115 4120 4125 | 12384 |
| gcg aac ctg ggg agg gaa gtc ggg gtt cgg gat gtg gtg ttc ggc tcc Ala Asn Leu Gly Arg Glu Val Gly Val Arg Asp Val Val Phe Gly Ser 4130 4135 4140 | 12432 |
| gac gag tcc ttg ctg gat cgg act ttg tgg gcg cag tcg ggt ttg ttc Asp Glu Ser Leu Leu Asp Arg Thr Leu Trp Ala Gln Ser Gly Leu Phe 4145 4150 4155 4160 | 12480 |
| gcg ttg cag gtc ggt ctc tgg gaa ttg ttg ggt acg tgg ggt gtt cgg Ala Leu Gln Val Gly Leu Trp Glu Leu Leu Gly Thr Trp Gly Val Arg 4165 4170 4175 | 12528 |
| ccc agc gta gtg ctg ggg cat tcg gtc ggg gag cta gcc gcg gcg ttc Pro Ser Val Val Leu Gly His Ser Val Gly Glu Leu Ala Ala Ala Phe 4180 4185 4190 | 12576 |
| gcc gca ggt gtg ctg tcg atg gcg gag gcg gct cgg ctg gtg gcg ggt Ala Ala Gly Val Leu Ser Met Ala Glu Ala Ala Arg Leu Val Ala Gly 4195 4200 4205 | 12624 |
| cgt gcg cgg ttg atg cag gcg ttg cct tct ggc ggt gcc atg ctg gcg Arg Ala Arg Leu Met Gln Ala Leu Pro Ser Gly Gly Ala Met Leu Ala 4210 4215 4220 | 12672 |
| gtg tcc gcg acc gag gcc cga gtc ggc ccg ctg ctc gat ggg gtg cgg Val Ser Ala Thr Glu Ala Arg Val Gly Pro Leu Leu Asp Gly Val Arg 4225 4230 4235 4240 | 12720 |
| gat cgt gtt ggt gtc gca gcg gtt aac gct ccg ggg tcg gtg gtg ctt Asp Arg Val Gly Val Ala Ala Val Asn Ala Pro Gly Ser Val Val Leu 4245 4250 4255 | 12768 |
| tcc ggt gac cgg gat gtg ctc gat ggc att gcc ggt cgg ctg gac ggg Ser Gly Asp Arg Asp Val Leu Asp Gly Ile Ala Gly Arg Leu Asp Gly 4260 4265 4270 | 12816 |

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|---|-------|
| caa ggt atc cgg tcg agg tgg ttg cgg gtt tcg cac gcg ttt cat tcg Gln Gly Ile Arg Ser Arg Trp Leu Arg Val Ser His Ala Phe His Ser 4275 4280 4285 | 12864 |
| cat cgg atg gat ccg atg ctg gcg gag ttc gcc gag ctc gca cgg agc His Arg Met Asp Pro Met Leu Ala Glu Phe Ala Glu Leu Ala Arg Ser 4290 4295 4300 | 12912 |
| gtg gac tac cgg tct cca cgg ctg ccg att gtc tcg acg ctg acc gga Val Asp Tyr Arg Ser Pro Arg Leu Pro Ile Val Ser Thr Leu Thr Gly 4305 4310 4315 4320 | 12960 |
| aac ctc gat gac gtg ggc gtg atg gct acg ccg gag tat tgg gtg cgc Asn Leu Asp Asp Val Gly Val Met Ala Thr Pro Glu Tyr Trp Val Arg 4325 4330 4335 | 13008 |
| cag gtg cga gag ccc gtc cgc ttc gcc gac ggt gtc cag gcg ctt gtg Gln Val Arg Glu Pro Val Arg Phe Ala Asp Gly Val Gln Ala Leu Val 4340 4345 4350 | 13056 |
| gac caa ggc gtc gac acg att gtg gaa ctc ggt ccg gac ggg gcg ttg Asp Gln Gly Val Asp Thr Ile Val Glu Leu Gly Pro Asp Gly Ala Leu 4355 4360 4365 | 13104 |
| tcg agc ttg gtt caa gag tgt gtg gcg gag tcc ggg ccg gcg acg ggg Ser Ser Leu Val Gln Glu Cys Val Ala Glu Ser Gly Arg Ala Thr Gly 4370 4375 4380 | 13152 |
| att ccg ttg gtg cgg aga gac cgt gat gag gtc cga acg gtg ctg gac Ile Pro Leu Val Arg Asp Arg Asp Glu Val Arg Thr Val Leu Asp 4385 4390 4395 4400 | 13200 |
| gct ttg gcg cag acc cac act cgt ggt ggc gcg gtg gac tgg ggg tca Ala Leu Ala Gln Thr His Thr Arg Gly Gly Ala Val Asp Trp Gly Ser 4405 4410 4415 | 13248 |
| ttt ttc gct ggt acg agg gca acg caa gtc gac ctt ccc acg tat gcc Phe Phe Ala Gly Thr Arg Ala Thr Gln Val Asp Leu Pro Thr Tyr Ala 4420 4425 4430 | 13296 |
| ttc caa cga cag cgg tac tgg ctg gag cca tcg gat tcc ggt gat gtg Phe Gln Arg Gln Arg Tyr Trp Leu Glu Pro Ser Asp Ser Gly Asp Val 4435 4440 4445 | 13344 |
| acc ggt gtt ggc ctg acc ggg gcg gag cat ccg ctg ttg ggt gcc gtg Thr Gly Val Gly Leu Thr Gly Ala Glu His Pro Leu Leu Gly Ala Val 4450 4455 4460 | 13392 |
| gtg ccg gtc gcg ggc ggc gat gag gtg ctg ctg acc ggc agg ctg tcg Val Pro Val Ala Gly Gly Asp Glu Val Leu Leu Thr Gly Arg Leu Ser 4465 4470 4475 4480 | 13440 |
| gtg ggg acg cat ccg tgg ctg gcg gaa cac cgc gtg ctg ggc gaa gtc Val Gly Thr His Pro Trp Leu Ala Glu His Arg Val Leu Gly Glu Val 4485 4490 4495 | 13488 |
| gtc gtc ccc ggc acc gcg ttg ctg gag atg gcg tgg ccg gcc ggt agc Val Val Pro Gly Thr Ala Leu Leu Glu Met Ala Trp Arg Ala Gly Ser 4500 4505 4510 | 13536 |
| cag gtc ggt tgt gaa cgt gtg gag gag ctc acc ttg gag gca ccg ctg Gln Val Gly Cys Glu Arg Val Glu Glu Leu Thr Leu Glu Ala Pro Leu 4515 4520 4525 | 13584 |

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| 4515 | 4520 | 4525 | |
|---|------|------|-------|
| gtc ctg ccg gag cgg ggc gct gcg gcg gtg cag ttg gcg gtg ggg gct Val Leu Pro Glu Arg Gly Ala Ala Ala Val Gln Leu Ala Val Gly Ala 4530 4535 4540 | | | 13632 |
| ccg gat gag gcc ggc cgg cgc agt ttg cag ctc tat tcc cga ggc gct Pro Asp Glu Ala Gly Arg Arg Ser Leu Gln Leu Tyr Ser Arg Gly Ala 4545 4550 4555 4560 | | | 13680 |
| gat gaa gac ggc gac tgg cgg cgg att gcc tcc ggg ctg ttg gcc cag Asp Glu Asp Gly Asp Trp Arg Arg Ile Ala Ser Gly Leu Leu Ala Gln 4565 4570 4575 | | | 13728 |
| gcc aat gcg gtg ccg ccg gcg gat tcg acg gca tgg ccg ccg gac ggc Ala Asn Ala Val Pro Pro Ala Asp Ser Thr Ala Trp Pro Pro Asp Gly 4580 4585 4590 | | | 13776 |
| gcc ggg cag gtc gat ctg gcg gag ttc tac gag cgc ctc gcc gag cgc Ala Gly Gln Val Asp Leu Ala Glu Phe Tyr Glu Arg Leu Ala Glu Arg 4595 4600 4605 | | | 13824 |
| ggc ttg acc tac ggt ccg gta ttc caa ggg ctc cgc gcc gca tgg cgg Gly Leu Thr Tyr Gly Pro Val Phe Gln Gly Leu Arg Ala Ala Trp Arg 4610 4615 4620 | | | 13872 |
| cac ggc gac gat atc ttc gcc gaa ttg gcc ggg tca cca gac gcc tcg His Gly Asp Asp Ile Phe Ala Glu Leu Ala Gly Ser Pro Asp Ala Ser 4625 4630 4635 4640 | | | 13920 |
| ggt ttc ggc atc cac ccg gcg ctg ctg gac gct gca ctg cac gcg atg Gly Phe Gly Ile His Pro Ala Leu Leu Asp Ala Ala Leu His Ala Met 4645 4650 4655 | | | 13968 |
| gcg ctt ggt gct tcg ccc gac tcg gaa gcg cgt ctg ccg ttt tcc tgg Ala Leu Gly Ala Ser Pro Asp Ser Glu Ala Arg Leu Pro Phe Ser Trp 4660 4665 4670 | | | 14016 |
| cgt ggc gcc cag ctg tac cgc gct gaa gga gca gcg ctt cgg gta cgg Arg Gly Ala Gln Leu Tyr Arg Ala Glu Gly Ala Ala Leu Arg Val Arg 4675 4680 4685 | | | 14064 |
| ctc tcg ccg ctg ggc tcc ggt gca gtc tca ttg acg ttg gtg gat gcc Leu Ser Pro Leu Gly Ser Gly Ala Val Ser Leu Thr Leu Val Asp Ala 4690 4695 4700 | | | 14112 |
| aca ggg cga cga gtc gct gcg gtg gaa tcg ctt tcg acg cga ccg gtc Thr Gly Arg Arg Val Ala Ala Val Glu Ser Leu Ser Thr Arg Pro Val 4705 4710 4715 4720 | | | 14160 |
| tcc acc gac cag atc ggt gcc ggt cgc ggc gat caa gag cgg ctg ctg Ser Thr Asp Gln Ile Gly Ala Gly Arg Gly Asp Gln Glu Arg Leu Leu 4725 4730 4735 | | | 14208 |
| cac gtc gag tgg gta agg tcg gct gaa tct gcg ggg atg tct ctg acc His Val Glu Trp Val Arg Ser Ala Glu Ser Ala Gly Met Ser Leu Thr 4740 4745 4750 | | | 14256 |
| tcc tgc gcg gtg gtc ggt ttg ggc gaa ccg gag tgg cac gct gcg ctg Ser Cys Ala Val Val Gly Leu Glu Pro Glu Trp His Ala Ala Leu 4755 4760 4765 | | | 14304 |
| aag acc act ggt gtc caa gtc gag tcc cat gcg gac ctt gct tcg ttg | | | 14352 |

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| | |
|---|-------|
| Lys Thr Thr Gly Val Gln Val Glu Ser His Ala Asp Leu Ala Ser Leu | |
| 4770 4775 4780 | |
| gcc acc gag gtt gcc aag cgg ggt tca gct cct ggt gcg gtc atc gtc | 14400 |
| Ala Thr Glu Val Ala Lys Arg Gly Ser Ala Pro Gly Ala Val Ile Val | |
| 4785 4790 4795 4800 | |
| ccg tgc ccg cga ccc cga gcg atg cag gag ctg ccg acc gcc gcg cga | 14448 |
| Pro Cys Pro Arg Pro Arg Ala Met Gln Glu Leu Pro Thr Ala Ala Arg | |
| 4805 4810 4815 | |
| agg gcg acg caa cag gcg atg gcg atg ctg cag caa tgg ctt gcc gat | 14496 |
| Arg Ala Thr Gln Gln Ala Met Ala Met Leu Gln Gln Trp Leu Ala Asp | |
| 4820 4825 4830 | |
| gac cgg ttc gtc agt acg cgc ctg atc ctg ctg acg cat cgg gcg gtc | 14544 |
| Asp Arg Phe Val Ser Thr Arg Leu Ile Leu Leu Thr His Arg Ala Val | |
| 4835 4840 4845 | |
| tcc gca gtt gct gga gaa gac gtg ctc gac ctg gta cac gcg ccg ctg | 14592 |
| Ser Ala Val Ala Gly Glu Asp Val Leu Asp Leu Val His Ala Pro Leu | |
| 4850 4855 4860 | |
| tgg ggc ttg gtc cgc agc gcg caa gcg gag cac ccg gac cga ttc gcc | 14640 |
| Trp Gly Leu Val Arg Ser Ala Gln Ala Glu His Pro Asp Arg Phe Ala | |
| 4865 4870 4875 4880 | |
| ttg atc gat atg gac gac gag cga gca tcg cag acg gca ctc gcc gaa | 14688 |
| Leu Ile Asp Met Asp Asp Glu Arg Ala Ser Gln Thr Ala Leu Ala Glu | |
| 4885 4890 4895 | |
| gcg ctg act gcg gga gaa gcg cag ctc gcg gtg cgg tcg gga gtt gtg | 14736 |
| Ala Leu Thr Ala Gly Glu Ala Gln Leu Ala Val Arg Ser Gly Val Val | |
| 4900 4905 4910 | |
| ctg gcg ccc cgc ctc ggc cag gtg aag gtg agt gga ggt gaa gcg ttc | 14784 |
| Leu Ala Pro Arg Leu Gly Gln Val Lys Val Ser Gly Gly Glu Ala Phe | |
| 4915 4920 4925 | |
| agg tgg gat gaa ggc acc gtg ctg gtc acc ggc gga acc ggc ggg ctc | 14832 |
| Arg Trp Asp Glu Gly Thr Val Leu Val Thr Gly Gly Thr Gly Gly Leu | |
| 4930 4935 4940 | |
| ggg gcc ctg ctc gca cgc cat ctg gtc agc gcc cac ggt gtg cgg cac | 14880 |
| Gly Ala Leu Leu Ala Arg His Leu Val Ser Ala His Gly Val Arg His | |
| 4945 4950 4955 4960 | |
| ctg ttg ctc gca agt cgc cgt ggt ctg gcg gcg ccc gga gcg gat gag | 14928 |
| Leu Leu Leu Ala Ser Arg Arg Gly Leu Ala Ala Pro Gly Ala Asp Glu | |
| 4965 4970 4975 | |
| ctg gtg gcc gag ctg gag cag gcc ggc gcc gac gtc gcg gtc gtc gcg | 14976 |
| Leu Val Ala Glu Leu Glu Gln Ala Gly Ala Asp Val Ala Val Val Ala | |
| 4980 4985 4990 | |
| tgc gac tcg gca gat cgg gac tcg ctt gcg cgg ctg gtg gcg tcg gtg | 15024 |
| Cys Asp Ser Ala Asp Arg Asp Ser Leu Ala Arg Leu Val Ala Ser Val | |
| 4995 5000 5005 | |
| cct gcg gaa aac ccg ttg cgg gtg gtg gtg cac gcc gcc ggt gtg ctg | 15072 |
| Pro Ala Glu Asn Pro Leu Arg Val Val Val His Ala Ala Gly Val Leu | |
| 5010 5015 5020 | |

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| | |
|---|-------|
| gat gac ggt gtg ctg atg tcg atg tcg ccg gag cgc ttg gac gcg gtg Asp Asp Gly Val Leu Met Ser Met Ser Pro Glu Arg Leu Asp Ala Val 5025 5030 5035 5040 | 15120 |
| ttg cgg ccc aaa gtg gat gcc gcg tgg tac ctg cac gag ctg act cgg Leu Arg Pro Lys Val Asp Ala Ala Trp Tyr Leu His Glu Leu Thr Arg 5045 5050 5055 | 15168 |
| gaa ctc ggt ctg tcg gcg ttc gtg ttg ttc tcc tcg gtc gcg ggc ctg Glu Leu Gly Leu Ser Ala Phe Val Leu Phe Ser Ser Val Ala Gly Leu 5060 5065 5070 | 15216 |
| ttc ggc ggt gcg ggg cag agc aat tac gct gcc ggc aac gct ttc ctg Phe Gly Gly Ala Gly Gln Ser Asn Tyr Ala Ala Gly Asn Ala Phe Leu 5075 5080 5085 | 15264 |
| gat gcc ttg gcg cat tgc cgg cag gcc cag ggg ctg ccc gcg ctg tcg Asp Ala Leu Ala His Cys Arg Gln Ala Gln Gly Leu Pro Ala Leu Ser 5090 5095 5100 | 15312 |
| ctg gcc tcc ggg ctg tgg gcg agt atc gat gga atg gcg ggc gac ctc Leu Ala Ser Gly Leu Trp Ala Ser Ile Asp Gly Met Ala Gly Asp Leu 5105 5110 5115 5120 | 15360 |
| gct gcg gca gat gtg gag cgg ctg tcg cgg gca ggc att ggc ccg ctt Ala Ala Ala Asp Val Glu Arg Leu Ser Arg Ala Gly Ile Gly Pro Leu 5125 5130 5135 | 15408 |
| tcg gca ccg gga ggg ctg gcc ttg ttc gac gct gcc gtt ggc tcg gac Ser Ala Pro Gly Gly Leu Ala Leu Phe Asp Ala Ala Val Gly Ser Asp 5140 5145 5150 | 15456 |
| gaa ccg ttg ctg gca ccg gtg cga ctg gat gtc gaa gca ctg cgt gtg Glu Pro Leu Leu Ala Pro Val Arg Leu Asp Val Glu Ala Leu Arg Val 5155 5160 5165 | 15504 |
| cag gcc cga tcc gtg cag acc cgg att ccg gaa atg ctg cat ggc atg Gln Ala Arg Ser Val Gln Thr Arg Ile Pro Glu Met Leu His Gly Met 5170 5175 5180 | 15552 |
| gca atg ggg cca agc cgc cgc act ccg ttc act tcc agg gtt gag ccg Ala Met Gly Pro Ser Arg Arg Thr Pro Phe Thr Ser Arg Val Glu Pro 5185 5190 5195 5200 | 15600 |
| ttg cac gaa cgg ctg gcc gga ttg tcg gag ggc gaa cgt cgg cag caa Leu His Glu Arg Leu Ala Gly Leu Ser Glu Gly Glu Arg Arg Gln Gln 5205 5210 5215 | 15648 |
| gtg ctc cag cgc gtc cgc gcc gat atc gcg gtg gta ctg ggg cac ggc Val Leu Gln Arg Val Arg Ala Asp Ile Ala Val Val Leu Gly His Gly 5220 5225 5230 | 15696 |
| agg tcg agc gat gtg gac atc gag aag cct ttg gcc gag ctg ggt ttc Arg Ser Ser Asp Val Asp Ile Glu Lys Pro Leu Ala Glu Leu Gly Phe 5235 5240 5245 | 15744 |
| gac tcg ctg acg gcc atc gaa ctc cgc aac cgt ctc gct acc gcc acc Asp Ser Leu Thr Ala Ile Glu Leu Arg Asn Arg Leu Ala Thr Ala Thr 5250 5255 5260 | 15792 |
| gga ctg cgg ctt ccc gcg acg ctg gcc ttc gac cac ggc act gcg gcg Gly Leu Arg Leu Pro Ala Thr Leu Ala Phe Asp His Gly Thr Ala Ala 5265 5270 5275 5280 | 15840 |

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| | |
|---|-------|
| gca ctc gcc cag cac gtg tgc gcg cag cta ggc acc gcg acc gcg ccg Ala Leu Ala Gln His Val Cys Ala Gln Leu Gly Thr Ala Thr Ala Pro 5285 5290 5295 | 15888 |
| gca ccg agg cga acc gac gac aac gac gcc acg gag ccc gtg agg tcg Ala Pro Arg Arg Thr Asp Asp Asn Asp Ala Thr Glu Pro Val Arg Ser 5300 5305 5310 | 15936 |
| ctc ttc caa cag gcg tat gcg gct ggc cgg ata ctt gac ggg atg gat Leu Phe Gln Gln Ala Tyr Ala Ala Gly Arg Ile Leu Asp Gly Met Asp 5315 5320 5325 | 15984 |
| ttg gtg aag gtc gct gcc cag ttg cga ccg gtg ttc ggt tcg cct ggc Leu Val Lys Val Ala Ala Gln Leu Arg Pro Val Phe Gly Ser Pro Gly 5330 5335 5340 | 16032 |
| gag ctg gaa tcc ctg ccg aaa ccc gtc cag ctt tcc cgt ggt ccc gaa Glu Leu Glu Ser Leu Pro Lys Pro Val Gln Leu Ser Arg Gly Pro Glu 5345 5350 5355 5360 | 16080 |
| gag ctt gcc ttg gtg tgc atg ccg gcg ctg atc ggg atg ccg ccc gca Glu Leu Ala Leu Val Cys Met Pro Ala Leu Ile Gly Met Pro Pro Ala 5365 5370 5375 | 16128 |
| cag cag tac gcg cgg atc gcc gcc ggg ttc cgc gat gtg cgg gac gtt Gln Gln Tyr Ala Arg Ile Ala Ala Gly Phe Arg Asp Val Arg Asp Val 5380 5385 5390 | 16176 |
| tcg gtg atc ccg atg cct gga ttc att gcg gga gaa ccg ctg ccg tcc Ser Val Ile Pro Met Pro Gly Phe Ile Ala Gly Glu Pro Leu Pro Ser 5395 5400 5405 | 16224 |
| gcc atc gag gtg gcg gtt cgg acg cag gcg gag gcg gtg ctg cag gaa Ala Ile Glu Val Ala Val Arg Thr Gln Ala Glu Ala Val Leu Gln Glu 5410 5415 5420 | 16272 |
| ttc gcc ggg ggc tcg ttc gta ctg gtc ggg cat tcc tcc ggg ggc tgg Phe Ala Gly Gly Ser Phe Val Leu Val Gly His Ser Ser Gly Gly Trp 5425 5430 5435 5440 | 16320 |
| ctg gcg cac gag gta gcc ggt gag ctg gag cgt cgc ggg gtc gtc ccg Leu Ala His Glu Val Ala Gly Glu Leu Glu Arg Arg Gly Val Val Pro 5445 5450 5455 | 16368 |
| gcc ggg gtc gta ctg ctg gac acc tac atc ccc ggt gag atc acg ccg Ala Gly Val Val Leu Leu Asp Thr Tyr Ile Pro Gly Glu Ile Thr Pro 5460 5465 5470 | 16416 |
| agg ttc tcc gtg gcg atg gcc cac cgg acg tat gag aag ctc gcg act Arg Phe Ser Val Ala Met Ala His Arg Thr Tyr Glu Lys Leu Ala Thr 5475 5480 5485 | 16464 |
| ttc acg gac atg cag gat gtc ggt atc acc gcg atg ggc ggg tac ttc Phe Thr Asp Met Gln Asp Val Gly Ile Thr Ala Met Gly Gly Tyr Phe 5490 5495 5500 | 16512 |
| cgg atg ttc acc gag tgg act ccg acg ccg atc ggt gct ccg acg ctg Arg Met Phe Thr Glu Trp Thr Pro Thr Pro Ile Gly Ala Pro Thr Leu 5505 5510 5515 5520 | 16560 |
| ttc gtg cgg acc gaa gat tgc gtc gca gac cct gaa ggg cgg ccg tgg Phe Val Arg Thr Glu Asp Cys Val Ala Asp Pro Glu Gly Arg Pro Trp 5525 5530 5535 5540 | 16608 |

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| 5525 | 5530 | 5535 | |
|--|------|------|------|
| aca gat gac tcc tgg cgg cca ggg tgg act ctc gcg gat gcc acg gtc Thr Asp Asp Ser Trp Arg Pro Gly Trp Thr Leu Ala Asp Ala Thr Val | 5540 | 5545 | 5550 |
| cag gtg ccg ggc gac cac ttc tcg atg atg gac gag cac gcc ggg tcc Gln Val Pro Gly Asp His Phe Ser Met Met Asp Glu His Ala Gly Ser | 5555 | 5560 | 5565 |
| acc gca cag gca gtc gcg agt tgg ctt gac aaa ctc aac cag cgc acc Thr Ala Gln Ala Val Ala Ser Trp Leu Asp Lys Leu Asn Gln Arg Thr | 5570 | 5575 | 5580 |
| gct cgg caa cgc tga Ala Arg Gln Arg | | | |

16656

16704

16752

16767

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 <211> 5588
 <212> PRT
 <213> Saccharopolyspora spinosa

<400> 50
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 Glu Leu Glu Glu Ala His Glu Arg Leu His Glu Leu Glu Arg Gln Glu
 20 25 30
 His Asp Pro Ile Ala Ile Val Ser Met Gly Cys Arg Tyr Pro Gly Gly
 35 40 45
 Val Ser Thr Pro Glu Glu Leu Trp Arg Leu Val Val Asp Gly Gly Asp
 50 55 60
 Ala Ile Ala Asn Phe Pro Glu Asp Arg Gly Trp Asn Leu Asp Glu Leu
 65 70 75 80
 Phe Asp Pro Asp Pro Gly Arg Ala Gly Thr Ser Tyr Val Arg Glu Gly
 85 90 95
 Gly Phe Leu Arg Gly Val Ala Asp Phe Asp Ala Gly Leu Phe Gly Ile
 100 105 110
 Ser Pro Arg Glu Ala Gln Ala Met Asp Pro Gln Gln Arg Leu Leu Leu
 115 120 125
 Glu Ile Ser Trp Glu Val Phe Glu Arg Ala Gly Ile Asp Pro Phe Ser
 130 135 140
 Leu Arg Gly Thr Lys Thr Gly Val Phe Ala Gly Leu Ile Tyr His Asp
 145 150 155 160
 Tyr Ala Ser Arg Phe Arg Lys Thr Pro Ala Glu Phe Glu Gly Tyr Phe
 165 170 175
 Ala Thr Gly Asn Ala Gly Ser Val Ala Ser Gly Arg Val Ala Tyr Thr
 180 185 190
 Phe Gly Leu Glu Gly Pro Ala Val Thr Val Asp Thr Ala Cys Ser Ser
 195 200 205

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Ser Leu Val Ala Leu His Leu Ala Cys Gln Ser Leu Arg Leu Gly Glu
 210 215 220
 Cys Asp Leu Ala Leu Ala Gly Gly Ile Ser Val Met Ala Thr Pro Gly
 225 230 235 240
 Ala Phe Val Glu Phe Ser Arg Gln Arg Ala Leu Ala Ser Asp Gly Arg
 245 250 255
 Cys Lys Pro Phe Ala Asp Ala Ala Asp Gly Thr Gly Trp Gly Glu Gly
 260 265 270
 Ala Gly Met Leu Leu Leu Glu Arg Leu Ser Asp Ala Arg Arg Asn Gly
 275 280 285
 His Pro Val Leu Ala Ala Val Val Gly Ser Ala Ile Asn Gln Asp Gly
 290 295 300
 Thr Ser Asn Gly Leu Thr Ala Pro Ser Gly Pro Ala Gln Gln Arg Val
 305 310 315 320
 Ile Arg Gln Ala Leu Ala Asn Ala Gly Leu Ser Pro Ala Glu Val Asp
 325 330 335
 Val Val Glu Ala His Gly Thr Gly Thr Ala Leu Gly Asp Pro Ile Glu
 340 345 350
 Ala Gln Ala Leu Ile Ala Thr Tyr Gly Ala Asn Arg Ser Ala Asp His
 355 360 365
 Pro Leu Leu Leu Gly Ser Leu Lys Ser Asn Ile Gly His Thr Gln Ala
 370 375 380
 Ala Ala Gly Val Ala Gly Val Ile Lys Ser Val Leu Ala Ile Arg His
 385 390 395 400
 Arg Glu Met Pro Arg Ser Leu His Ile Asp Gln Pro Ser Gln His Val
 405 410 415
 Asp Trp Ser Ala Gly Ala Val Arg Leu Leu Thr Asp Ser Val Asp Trp
 420 425 430
 Pro Asp Leu Gly Arg Pro Arg Arg Ala Gly Val Ser Ser Phe Gly Met
 435 440 445
 Ser Gly Thr Asn Ala His Leu Ile Val Glu Glu Val Ser Asp Glu Pro
 450 455 460
 Val Ser Gly Ser Thr Glu Pro Thr Gly Ala Phe Pro Trp Pro Leu Ser
 465 470 475 480
 Gly Lys Thr Glu Thr Ala Leu Arg Glu Gln Ala Ala Glu Leu Leu Ser
 485 490 495
 Val Val Thr Glu His Pro Glu Pro Gly Leu Gly Asp Val Gly Tyr Ser
 500 505 510
 Leu Ala Thr Gly Arg Ala Ala Met Glu His Arg Ala Val Val Val Ala
 515 520 525
 Asp Asp Arg Asp Ser Phe Val Ala Gly Leu Thr Ala Leu Ala Ala Gly
 530 535 540

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| | | | | | | | | | | | | | | | |
|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| Val 545 | Pro | Ala | Ala | Asn | Val 550 | Val | Gln | Gly | Ala | Ala 555 | Asp | Cys | Lys | Gly | Lys 560 |
| Val | Ala | Phe | Val | Phe 565 | Pro | Gly | Gln | Gly | Ser 570 | His | Trp | Gln | Gly | Met 575 | Ala |
| Arg | Glu | Leu | Ser 580 | Glu | Ser | Ser | Pro | Val 585 | Phe | Arg | Arg | Lys | Leu 590 | Ala | Glu |
| Cys | Ala | Ala 595 | Ala | Thr | Ala | Pro | Tyr 600 | Val | Asp | Trp | Ser | Leu 605 | Leu | Gly | Val |
| Leu | Arg 610 | Gly | Asp | Pro | Asp | Ala 615 | Pro | Ala | Leu | Asp | Arg 620 | Asp | Asp | Val | Ile |
| Gln 625 | Leu | Ala | Leu | Phe | Ala 630 | Met | Met | Val | Ser | Leu 635 | Ala | Glu | Leu | Trp | Arg 640 |
| Ser | Cys | Gly | Val | Glu 645 | Pro | Ala | Ala | Val | Val 650 | Gly | His | Ser | Gln | Gly 655 | Glu |
| Ile | Ala | Ala | Ala 660 | His | Val | Ala | Gly | Ala 665 | Leu | Ser | Leu | Thr | Asp 670 | Ala | Val |
| Arg | Ile | Ile 675 | Ala | Ala | Arg | Cys | Asp 680 | Ala | Val | Ser | Ala | Leu 685 | Thr | Gly | Lys |
| Gly | Gly 690 | Met | Leu | Ala | Ile | Ala 695 | Leu | Pro | Glu | Ser | Ala 700 | Val | Val | Lys | Arg |
| Ile 705 | Ala | Gly | Leu | Pro | Glu 710 | Leu | Thr | Val | Ala | Ala 715 | Val | Asn | Gly | Pro | Gly 720 |
| Ser | Thr | Val | Val | Ser 725 | Gly | Glu | Pro | Ser | Ala 730 | Leu | Glu | Arg | Leu | Gln 735 | Thr |
| Glu | Leu | Thr | Ala 740 | Glu | Asn | Val | Gln | Thr 745 | Arg | Arg | Val | Gly | Ile 750 | Asp | Tyr |
| Ala | Ser | His 755 | Ser | Pro | Gln | Ile | Ala 760 | Gln | Val | Gln | Gly | Arg 765 | Leu | Leu | Asp |
| Arg | Leu 770 | Gly | Glu | Val | Gly | Ser 775 | Glu | Pro | Ala | Glu | Ile 780 | Ala | Phe | Tyr | Ser |
| Thr 785 | Val | Thr | Gly | Glu | Arg 790 | Thr | Asp | Thr | Gly | Arg 795 | Leu | Asp | Ala | Asp | Tyr 800 |
| Trp | Tyr | Gln | Asn 805 | Leu | Arg | Gln | Pro | Val | Arg 810 | Phe | Gln | Gln | Thr | Val 815 | Ala |
| Arg | Met | Ala | Asp 820 | Gln | Gly | Tyr | Arg | Phe 825 | Phe | Val | Glu | Val | Ser 830 | Pro | His |
| Pro | Leu | Leu 835 | Thr | Ala | Gly | Ile | Gln 840 | Glu | Thr | Leu | Glu | Ala 845 | Ala | Asp | Ala |
| Gly | Gly 850 | Val | Val | Val | Gly | Ser 855 | Leu | Arg | Arg | Gly | Glu 860 | Gly | Gly | Ser | Arg |
| Arg 865 | Trp | Leu | Thr | Ser | Leu 870 | Ala | Glu | Cys | Gln | Val 875 | Arg | Gly | Leu | Pro | Val 880 |

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Asn Trp Glu Gln Val Phe Leu Asn Thr Gly Ala Arg Arg Val Pro Leu
 885 890 895
 Pro Thr Tyr Pro Phe Gln Arg Gln Arg Tyr Trp Leu Glu Ser Ala Glu
 900 905 910
 Tyr Asp Ala Gly Asp Leu Gly Ser Val Gly Leu Leu Ser Ala Glu His
 915 920 925
 Pro Leu Leu Gly Ala Ala Val Thr Leu Ala Asp Ala Gly Gly Phe Leu
 930 935 940
 Leu Thr Gly Lys Leu Ser Val Lys Thr Gln Pro Trp Leu Ala Asp His
 945 950 955 960
 Val Val Gly Gly Ala Ile Leu Leu Pro Gly Thr Ala Phe Val Glu Met
 965 970 975
 Leu Ile Arg Ala Ala Asp Gln Val Gly Cys Asp Leu Ile Glu Glu Leu
 980 985 990
 Ser Leu Thr Thr Pro Leu Val Leu Pro Ala Thr Gly Ala Val Gln Val
 995 1000 1005
 Gln Ile Ala Val Gly Gly Pro Asp Glu Ala Gly Arg Arg Ser Val Arg
 1010 1015 1020
 Val His Ser Cys Arg Asp Asp Ala Val Pro Gln Asp Ser Trp Thr Cys
 025 1030 1035 1040
 His Ala Thr Gly Thr Leu Thr Ser Ser Asp His Gln Asp Ala Gly Gln
 1045 1050 1055
 Gly Pro Asp Gly Ile Trp Pro Pro Asn Asp Ala Val Ala Val Pro Leu
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 Asp Ser Phe Tyr Ala Arg Ala Ala Glu Arg Gly Phe Asp Phe Gly Pro
 1075 1080 1085
 Ala Phe Gln Gly Leu Gln Ala Ala Trp Lys Arg Gly Asp Glu Ile Phe
 1090 1095 1100
 Ala Glu Val Gly Leu Pro Thr Ala His Arg Glu Asp Ala Gly Arg Phe
 105 1110 1115 1120
 Gly Ile His Pro Ala Leu Leu Asp Ala Ala Leu Gln Ala Leu Gly Ala
 1125 1130 1135
 Ala Glu Glu Asp Pro Asp Glu Gly Trp Leu Pro Phe Ala Trp Gln Gly
 1140 1145 1150
 Val Ser Leu Lys Ala Thr Gly Ala Leu Ser Leu Arg Val His Leu Val
 1155 1160 1165
 Pro Ala Gly Ala Asn Ala Val Ser Val Phe Thr Thr Asp Thr Thr Gly
 1170 1175 1180
 Gln Ala Val Leu Ser Ile Asp Ser Leu Val Leu Arg Gln Ile Ser Asp
 185 1190 1195 1200
 Lys Gln Leu Ala Ala Ala Arg Ala Met Glu His Glu Ser Leu Phe Arg
 1205 1210 1215

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Val Asp Trp Lys Arg Ile Ser Pro Gly Ala Ala Lys Pro Val Ser Trp
1220 1225 1230
Ala Val Ile Gly Asn Asp Glu Leu Ala Arg Ala Cys Gly Ser Ala Leu
1235 1240 1245
Gly Thr Glu Leu His Pro Asp Leu Thr Gly Leu Ala Asp Pro Pro Pro
1250 1255 1260
Asp Val Val Val Val Pro Cys Gly Ala Ser Arg Gln Asp Leu Asp Val
265 1270 1275 1280
Ala Ser Glu Ala Arg Ala Ala Thr Gln Arg Met Leu Asp Leu Ile Gln
1285 1290 1295
Asp Trp Leu Ala Ala Ala Arg Phe Ala Gly Ser Arg Leu Val Val Val
1300 1305 1310
Thr Cys Gly Ala Ala Ser Thr Gly Pro Ala Glu Gly Val Ser Asp Leu
1315 1320 1325
Val His Ala Ala Ser Trp Gly Leu Leu Arg Ser Ala Gln Ser Glu Asn
1330 1335 1340
Pro Asp Arg Phe Val Leu Val Asp Val Asp Gly Thr Ala Glu Ser Trp
345 1350 1355 1360
Arg Ala Leu Ala Ala Ala Val Arg Ser Gly Glu Pro Gln Leu Ala Leu
1365 1370 1375
Arg Ala Gly Glu Val Arg Val Pro Arg Leu Ala Arg Cys Val Ala Ala
1380 1385 1390
Glu Asp Ser Arg Ile Pro Val Pro Gly Ala Asp Gly Thr Val Leu Ile
1395 1400 1405
Ser Gly Gly Thr Gly Leu Leu Gly Gly Leu Val Ala Arg His Leu Val
1410 1415 1420
Ala Glu Arg Gly Val Arg Arg Leu Val Leu Ala Gly Arg Arg Gly Trp
425 1430 1435 1440
Ser Ala Pro Gly Val Thr Asp Leu Val Asp Glu Leu Val Gly Leu Gly
1445 1450 1455
Ala Ala Val Glu Val Ala Ser Cys Asp Val Gly Asp Arg Ala Gln Leu
1460 1465 1470
Asp Arg Leu Leu Thr Thr Ile Ser Ala Glu Phe Pro Leu Arg Gly Val
1475 1480 1485
Val His Ala Ala Gly Ala Leu Ala Asp Gly Val Val Glu Ser Leu Thr
1490 1495 1500
Pro Glu His Val Ala Lys Val Phe Gly Pro Lys Ala Ala Gly Ala Trp
505 1510 1515 1520
His Leu His Glu Leu Thr Leu Asp Leu Asp Leu Ser Phe Phe Val Leu
1525 1530 1535
Phe Ser Ser Phe Ser Gly Val Ala Gly Ala Ala Gly Gln Gly Asn Tyr
1540 1545 1550

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Ala Ala Ala Asn Ala Phe Leu Asp Gly Leu Ala Gln His Arg Arg Thr
1555 1560 1565

Ala Gly Leu Pro Ala Val Ser Leu Ala Trp Gly Leu Trp Glu Gln Pro
1570 1575 1580

Ser Gly Met Thr Gly Ala Leu Asp Ala Ala Gly Arg Ser Arg Ile Ala
585 1590 1595 1600

Arg Thr Asn Pro Pro Met Ser Ala Pro Asp Gly Leu Arg Leu Phe Glu
1605 1610 1615

Met Ala Phe Arg Val Pro Gly Glu Ser Leu Leu Val Pro Val His Val
1620 1625 1630

Asp Leu Asn Ala Leu Arg Ala Asp Ala Ala Asp Gly Gly Val Pro Ala
1635 1640 1645

Leu Leu Arg Asp Leu Val Pro Ala Pro Val Arg Arg Ser Ala Val Asn
1650 1655 1660

Glu Ser Ala Asp Val Asn Gly Leu Val Gly Arg Leu Arg Arg Leu Pro
665 1670 1675 1680

Asp Leu Asp Gln Glu Thr Gln Leu Leu Gly Leu Val Arg Glu His Val
1685 1690 1695

Ser Ala Val Leu Gly His Ser Gly Ala Val Glu Val Gly Ala Asp Arg
1700 1705 1710

Ala Phe Arg Asp Leu Gly Phe Asp Ser Leu Ser Gly Val Glu Phe Arg
1715 1720 1725

Asn Arg Leu Gly Gly Val Leu Gly Val Arg Leu Pro Ala Thr Ala Val
1730 1735 1740

Phe Asp Tyr Pro Thr Pro Arg Ala Leu Val Arg Phe Leu Leu Asp Lys
745 1750 1755 1760

Leu Ile Gly Gly Val Glu Ala Pro Thr Pro Ala Pro Ala Ala Val Ala
1765 1770 1775

Ala Val Thr Ala Asp Asp Pro Val Val Ile Val Gly Met Gly Cys Arg
1780 1785 1790

Tyr Pro Gly Gly Val Ser Ser Pro Glu Glu Leu Trp Arg Leu Val Ala
1795 1800 1805

Gly Gly Leu Asp Ala Val Ala Glu Phe Pro Asp Asp Arg Gly Trp Asp
1810 1815 1820

Gln Ala Gly Leu Phe Asp Pro Asp Pro Asp Arg Leu Gly Thr Ser Tyr
825 1830 1835 1840

Val Cys Glu Gly Gly Phe Leu Arg Asp Ala Ala Glu Phe Asp Ala Gly
1845 1850 1855

Phe Phe Gly Ile Ser Pro Arg Glu Ala Leu Ala Met Asp Pro Gln Gln
1860 1865 1870

Arg Leu Leu Leu Glu Val Ala Trp Glu Thr Val Glu Arg Ala Gly Ile
1875 1880 1885

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Asp Pro Leu Ser Leu Arg Gly Ser Arg Thr Gly Val Phe Ala Gly Leu
 1890 1895 1900
 Met His His Asp Tyr Gly Ala Arg Phe Ile Thr Arg Ala Pro Glu Gly
 905 1910 1915 1920
 Phe Glu Gly Tyr Leu Gly Asn Gly Ser Ala Gly Gly Val Phe Ser Gly
 1925 1930 1935
 Arg Val Ala Tyr Ser Phe Gly Phe Glu Gly Pro Ala Val Thr Val Asp
 1940 1945 1950
 Thr Ala Cys Ser Ser Ser Leu Val Ala Leu His Leu Ala Gly Gln Ala
 1955 1960 1965
 Leu Arg Ser Gly Glu Cys Asp Leu Ala Leu Ala Gly Gly Val Thr Val
 1970 1975 1980
 Met Ala Thr Pro Gly Met Phe Val Glu Phe Ser Arg Gln Arg Gly Leu
 985 1990 1995 2000
 Ala Ala Asp Gly Arg Cys Lys Ser Phe Ala Ala Ala Ala Asp Gly Thr
 2005 2010 2015
 Gly Trp Gly Glu Gly Ala Gly Leu Val Leu Leu Glu Arg Leu Ser Asp
 2020 2025 2030
 Ala Arg Arg Asn Gly His Ala Val Leu Ala Val Val Arg Gly Ser Ala
 2035 2040 2045
 Val Asn Gln Asp Gly Ala Ser Asn Gly Leu Thr Ala Pro Asn Gly Pro
 2050 2055 2060
 Ser Gln Gln Arg Val Ile Thr Gln Ala Leu Ala Ser Ala Gly Leu Ser
 065 2070 2075 2080
 Val Ser Asp Val Asp Ala Val Glu Ala His Gly Thr Gly Thr Arg Leu
 2085 2090 2095
 Gly Asp Pro Ile Glu Ala Gln Ala Leu Ile Ala Thr Tyr Gly Gln Gly
 2100 2105 2110
 Arg Asp Ser Asp Arg Pro Leu Trp Leu Gly Ser Val Lys Ser Asn Ile
 2115 2120 2125
 Gly His Thr Gln Ala Ala Ala Gly Val Ala Gly Val Ile Lys Met Val
 2130 2135 2140
 Met Ala Met Arg His Gly Gln Leu Pro Ala Thr Leu His Val Asp Glu
 145 2150 2155 2160
 Pro Thr Ser Glu Val Asp Trp Ser Ala Gly Asp Val Gln Leu Leu Thr
 2165 2170 2175
 Glu Asn Thr Pro Trp Pro Gly Asn Ser His Pro Arg Arg Val Gly Val
 2180 2185 2190
 Ser Ser Phe Gly Ile Ser Gly Thr Asn Ala His Val Ile Leu Glu Gln
 2195 2200 2205
 Ala Ser Lys Thr Pro Asp Glu Thr Ala Asp Lys Ser Gly Pro Asp Ser
 2210 2215 2220

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Glu Ser Thr Val Asp Leu Pro Ala Val Pro Leu Ile Val Ser Gly Arg
 225 2230 2235 2240
 Thr Pro Ala Ala Leu Ser Ala Gln Ala Ser Ala Leu Leu Ser Tyr Leu
 2245 2250 2255
 Gly Glu Arg Gly Asp Ile Ser Thr Leu Asp Ala Ala Phe Ser Leu Ala
 2260 2265 2270
 Ser Ser Arg Ala Ala Leu Glu Glu Arg Ala Val Val Leu Gly Ala Asp
 2275 2280 2285
 Arg Glu Thr Leu Leu Ser Gly Leu Glu Ala Leu Ala Ser Gly Arg Glu
 2290 2295 2300
 Ala Ser Gly Val Val Ser Gly Ser Pro Val Ser Gly Gly Val Gly Phe
 305 2310 2315 2320
 Val Phe Ala Gly Gln Gly Gly Gln Trp Leu Gly Met Gly Arg Gly Leu
 2325 2330 2335
 Tyr Ser Val Phe Pro Val Phe Ala Asp Ala Phe Asp Glu Ala Cys Ala
 2340 2345 2350
 Gly Leu Asp Ala His Leu Gly Gln Asp Val Gly Val Arg Asp Val Val
 2355 2360 2365
 Phe Gly Ser Asp Gly Ser Leu Leu Asp Arg Thr Leu Trp Ala Gln Ser
 2370 2375 2380
 Gly Leu Phe Ala Leu Gln Val Gly Leu Leu Ser Leu Leu Gly Ser Trp
 385 2390 2395 2400
 Gly Val Arg Pro Gly Val Val Leu Gly His Ser Val Gly Glu Phe Ala
 2405 2410 2415
 Ala Ala Val Ala Ala Gly Val Leu Ser Leu Pro Asp Ala Ala Arg Met
 2420 2425 2430
 Val Ala Gly Arg Ala Arg Leu Met Gln Ala Leu Pro Ser Gly Gly Ala
 2435 2440 2445
 Met Leu Ala Val Ala Ala Gly Glu Glu Gln Leu Arg Pro Leu Leu Ala
 2450 2455 2460
 Asp Arg Val Asp Gly Ala Gly Ile Ala Ala Val Asn Ala Pro Glu Ser
 465 2470 2475 2480
 Val Val Leu Ser Gly Asp Arg Glu Val Leu Asp Asp Ile Ala Gly Ala
 2485 2490 2495
 Leu Asp Gly Gln Gly Ile Arg Trp Arg Arg Leu Arg Val Ser His Ala
 2500 2505 2510
 Phe His Ser Tyr Arg Met Asp Pro Met Leu Gln Glu Phe Ala Glu Ile
 2515 2520 2525
 Ala Arg Ser Val Asp Tyr Arg Arg Gly Asp Leu Pro Val Val Ser Thr
 2530 2535 2540
 Leu Thr Gly Glu Leu Asp Thr Ala Gly Val Met Ala Thr Pro Glu Tyr
 545 2550 2555 2560

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Trp Val Arg Gln Val Arg Glu Pro Val Arg Phe Ala Asp Gly Val Arg
 2565 2570 2575
 Val Leu Ala Gln Gln Gly Val Ala Thr Ile Phe Glu Leu Gly Pro Asp
 2580 2585 2590
 Ala Thr Leu Ser Ala Leu Ile Pro Asp Cys His Ser Trp Ala Asp Gln
 2595 2600 2605
 Ala Met Pro Ile Pro Met Leu Arg Lys Asp Arg Thr Glu Thr Glu Thr
 2610 2615 2620
 Val Val Ala Ala Val Ala Arg Ala His Thr Arg Gly Val Pro Val Glu
 625 2630 2635 2640
 Trp Ser Ala Tyr Phe Ala Gly Thr Gly Ala Arg Arg Val Glu Leu Pro
 2645 2650 2655
 Thr Tyr Ala Phe Gln Arg Gln Arg Tyr Trp Leu Glu Thr Ser Asp Tyr
 2660 2665 2670
 Gly Asp Val Thr Gly Ile Gly Leu Ala Ala Ala Glu His Pro Leu Leu
 2675 2680 2685
 Gly Ala Val Val Ala Leu Ala Asp Gly Asp Gly Met Val Leu Thr Gly
 2690 2695 2700
 Arg Leu Ser Val Gly Thr His Pro Trp Leu Ala Gln His Arg Val Leu
 705 2710 2715 2720
 Gly Glu Val Val Val Pro Gly Thr Ala Ile Leu Glu Met Ala Leu His
 2725 2730 2735
 Ala Gly Ala Arg Leu Gly Cys Asp Arg Val Glu Glu Leu Thr Leu Glu
 2740 2745 2750
 Thr Pro Leu Val Val Pro Glu Arg Ala Ala Gly Ala Gly Ser Arg Gly
 2755 2760 2765
 Pro Ala Gly Gly Thr Thr Val Ser Ile Glu Thr Ala Glu Glu Arg Val
 2770 2775 2780
 Arg Thr Asn Asp Ala Ile Glu Ile Gln Leu Leu Val Asn Ala Pro Asp
 785 2790 2795 2800
 Glu Gly Gly Arg Arg Arg Val Ser Leu Tyr Ser Arg Pro Ala Gly Gly
 2805 2810 2815
 Ser Arg Gly Gly Gly Trp Thr Arg His Ala Thr Gly Glu Leu Val Val
 2820 2825 2830
 Gly Thr Thr Gly Gly Arg Ala Val Pro Asp Trp Ser Ala Glu Gly Ala
 2835 2840 2845
 Glu Ser Ile Ala Leu Asp Glu Phe Tyr Val Ala Leu Ala Gly Asn Gly
 2850 2855 2860
 Phe Glu Tyr Gly Pro Leu Phe Gln Gly Leu Gln Ala Ala Trp Arg Arg
 865 2870 2875 2880
 Gly Asp Glu Val Leu Ala Glu Ile Ala Pro Pro Ala Glu Ala Asp Ala
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Met Ala Ser Gly Tyr Leu Leu Asp Pro Ala Leu Leu Asp Ala Ala Leu
2900 2905 2910

Gln Ala Ser Ala Leu Gly Asp Arg Pro Glu Gln Gly Gly Ala Trp Leu
2915 2920 2925

Pro Phe Ser Phe Thr Gly Val Glu Leu Ser Ala Pro Ala Gly Thr Ile
2930 2935 2940

Ser Arg Val Arg Leu Glu Thr Arg Arg Pro Asp Ala Ile Ser Val Ala
945 2950 2955 2960

Val Met Asp Glu Ser Gly Arg Leu Leu Ala Ser Ile Asp Ser Leu Arg
2965 2970 2975

Leu Arg Ser Val Ser Ser Gly Gln Leu Ala Asn Arg Asp Ala Val Arg
2980 2985 2990

Asp Ala Leu Phe Glu Val Thr Trp Glu Pro Val Ala Thr Gln Ser Thr
2995 3000 3005

Glu Pro Gly Arg Trp Ala Leu Leu Gly Asp Thr Ala Cys Gly Lys Asp
3010 3015 3020

Asp Leu Ile Lys Leu Ala Thr Asp Ser Ala Asp Arg Cys Ala Asp Leu
025 3030 3035 3040

Ala Ala Leu Ala Glu Lys Leu Asp Ser Ser Ala Leu Val Pro Asp Val
3045 3050 3055

Val Val Tyr Cys Ala Gly Glu Gln Ala Asp Pro Gly Thr Gly Ala Ala
3060 3065 3070

Ala Leu Ala Glu Thr Gln Gln Thr Leu Ala Leu Leu Gln Ala Trp Leu
3075 3080 3085

Ala Glu Pro Arg Leu Ala Glu Ala Arg Leu Val Val Val Thr Cys Ala
3090 3095 3100

Ala Val Thr Thr Ala Pro Ser Asp Gly Ala Ser Glu Leu Ala His Ala
105 3110 3115 3120

Pro Leu Trp Gly Leu Leu Arg Ala Ala Gln Val Glu Asn Pro Gly Gln
3125 3130 3135

Phe Val Leu Ala Asp Val Asp Gly Thr Ala Glu Ser Trp Arg Ala Leu
3140 3145 3150

Pro Ser Ala Leu Gly Ser Met Glu Pro Gln Leu Ala Leu Arg Lys Gly
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Ala Val Arg Ala Pro Arg Leu Ala Ser Val Ala Gly Gln Ile Asp Val
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Pro Ala Val Val Ala Asp Pro Asp Arg Thr Val Leu Ile Ser Gly Gly
185 3190 3195 3200

Thr Gly Leu Leu Gly Gly Ala Val Ala Arg His Leu Val Thr Glu Arg
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Gly Val Arg Arg Leu Val Leu Thr Gly Arg Arg Gly Trp Asp Ala Pro
3220 3225 3230

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Gly Ile Thr Glu Leu Val Gly Glu Leu Asn Gly Leu Gly Ala Val Val
 3235 3240 3245
 Asp Val Val Ala Cys Asp Val Ala Asp Arg Ala Asp Leu Glu Ser Leu
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 Leu Ala Ala Val Pro Ala Glu Phe Pro Leu Cys Gly Val Val His Ala
 265 3270 3275 3280
 Ala Gly Ala Leu Ala Asp Gly Val Ile Glu Ser Leu Ser Pro Asp Asp
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 Val Gly Ala Val Phe Gly Pro Lys Ala Ala Gly Ala Trp Asn Leu His
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 Leu Ser Gly Val Ala Gly Ala Pro Gly Gln Gly Asn Tyr Ala Ala Ala
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 Asn Ala Phe Leu Asp Ala Leu Ala His Tyr Arg Arg Ser Gln Gly Leu
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 Thr Glu Thr Leu Ser Glu Val Asp Arg Ser Arg Ile Ala Arg Ala Asn
 3380 3385 3390
 Pro Pro Leu Ser Thr Lys Glu Gly Leu Arg Leu Phe Asp Ala Gly Leu
 3395 3400 3405
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 Leu Ala Glu Gln Ala Arg Ser Gly Ser Leu Pro Ala Leu Leu Thr Ala
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 Ala Asp Glu Gly Thr Leu Leu Gly Val Val Arg Glu His Ala Ala Ala
 3460 3465 3470
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 Arg Asp Leu Gly Phe Asp Ser Leu Ser Gly Val Glu Leu Arg Asn Arg
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 Tyr Pro Thr Pro Arg Ala Leu Ala Arg Phe Leu His Gln Glu Leu Ala
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 Val Ala Glu Asp Asp Leu Val Ala Ile Val Gly Met Gly Cys Arg Phe
 3555 3560 3565

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Pro Gly Gln Val Ser Ser Pro Glu Glu Leu Trp Arg Leu Val Ala Gly
 3570 3575 3580
 Gly Val Asp Ala Val Ala Asp Phe Pro Ala Asp Arg Gly Trp Asp Leu
 585 3590 3595 3600
 Ala Gly Leu Phe Asp Pro Asp Pro Glu Arg Ala Gly Lys Thr Tyr Val
 3605 3610 3615
 Arg Glu Gly Ala Phe Leu Thr Asp Ala Asp Arg Phe Asp Ala Gly Phe
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 Phe Gly Ile Ser Pro Arg Glu Ala Leu Ala Met Asp Pro Gln Gln Arg
 3635 3640 3645
 Leu Leu Leu Glu Leu Ser Trp Glu Ala Ile Glu Arg Ala Gly Ile Asp
 3650 3655 3660
 Pro Gly Ser Leu Arg Gly Ser Arg Thr Gly Val Phe Ala Gly Leu Met
 665 3670 3675 3680
 Tyr His Asp Tyr Gly Ala Arg Phe Ala Ser Arg Ala Pro Glu Gly Phe
 3685 3690 3695
 Glu Gly Tyr Leu Gly Asn Gly Ser Ala Gly Ser Val Ala Ser Gly Arg
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 Ile Ala Tyr Ser Phe Gly Phe Glu Gly Pro Ala Val Thr Val Asp Thr
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 Ala Cys Ser Ser Ser Leu Val Ala Leu His Leu Ala Gly Gln Ser Leu
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 Arg Ser Gly Glu Cys Asp Leu Ala Leu Ala Gly Gly Val Thr Val Met
 745 3750 3755 3760
 Ser Thr Pro Gly Thr Phe Val Glu Phe Ser Arg Gln Arg Gly Leu Ala
 3765 3770 3775
 Pro Asp Gly Arg Cys Lys Ser Phe Ala Glu Ser Ala Asp Gly Thr Gly
 3780 3785 3790
 Trp Gly Glu Gly Ala Gly Leu Val Leu Leu Glu Arg Leu Ser Asp Ala
 3795 3800 3805
 Arg Arg Asn Gly His Arg Val Leu Ala Val Val Arg Gly Ser Ala Val
 3810 3815 3820
 Asn Gln Asp Gly Ala Ser Asn Gly Leu Thr Ala Pro Asn Gly Pro Ser
 825 3830 3835 3840
 Gln Gln Arg Val Ile Gln Gln Ala Leu Ala Ser Ala Gly Leu Ser Val
 3845 3850 3855
 Ser Asp Val Asp Ala Val Glu Ala His Gly Thr Gly Thr Arg Leu Gly
 3860 3865 3870
 Asp Pro Ile Glu Ala Gln Ala Leu Ile Ala Thr Tyr Gly Arg Asp Arg
 3875 3880 3885
 Asp Pro Gly Arg Pro Leu Trp Leu Gly Ser Val Lys Ser Asn Ile Gly
 3890 3895 3900

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His Thr Gln Ala Ala Ala Gly Val Ala Gly Val Ile Lys Met Val Met
 905 3910 3915 3920
 Ala Met Arg His Gly Gln Leu Pro Arg Thr Leu His Val Asp Ala Pro
 3925 3930 3935
 Ser Ser Gln Val Asp Trp Ser Ala Gly Arg Val Gln Leu Leu Thr Glu
 3940 3945 3950
 Asn Thr Pro Trp Pro Asp Ser Gly Arg Pro Cys Arg Val Gly Val Ser
 3955 3960 3965
 Ser Phe Gly Ile Ser Gly Thr Asn Ala His Val Ile Leu Glu Gln Ser
 3970 3975 3980
 Thr Gly Gln Met Asp Gln Ala Ala Glu Pro Asp Ser Ser Pro Val Leu
 985 3990 3995 4000
 Asp Val Pro Val Val Pro Trp Val Val Ser Gly Lys Thr Pro Glu Ala
 4005 4010 4015
 Leu Ser Ala Gln Ala Ala Thr Leu Ala Thr Tyr Leu Asp Gln Asn Val
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 Asp Val Ser Pro Leu Asp Val Gly Ile Ser Leu Ala Val Thr Arg Ser
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 Ala Leu Asp Glu Arg Ala Val Val Leu Gly Ser Asp Arg Asp Thr Leu
 4050 4055 4060
 Leu Ser Gly Leu Asn Ala Leu Ala Ala Gly His Glu Ala Ala Gly Val
 065 4070 4075 4080
 Val Thr Gly Pro Val Gly Ile Gly Gly Arg Thr Gly Phe Val Phe Ala
 4085 4090 4095
 Gly Gln Gly Gly Gln Trp Leu Gly Met Gly Arg Arg Leu Tyr Ser Glu
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 Phe Pro Ala Phe Ala Gly Ala Phe Asp Glu Ala Cys Ala Glu Leu Asp
 4115 4120 4125
 Ala Asn Leu Gly Arg Glu Val Gly Val Arg Asp Val Val Phe Gly Ser
 4130 4135 4140
 Asp Glu Ser Leu Leu Asp Arg Thr Leu Trp Ala Gln Ser Gly Leu Phe
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 Ala Leu Gln Val Gly Leu Trp Glu Leu Leu Gly Thr Trp Gly Val Arg
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 Pro Ser Val Val Leu Gly His Ser Val Gly Glu Leu Ala Ala Ala Phe
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 Ala Ala Gly Val Leu Ser Met Ala Glu Ala Ala Arg Leu Val Ala Gly
 4195 4200 4205
 Arg Ala Arg Leu Met Gln Ala Leu Pro Ser Gly Gly Ala Met Leu Ala
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 Val Ser Ala Thr Glu Ala Arg Val Gly Pro Leu Leu Asp Gly Val Arg
 225 4230 4235 4240

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Asp Arg Val Gly Val Ala Ala Val Asn Ala Pro Gly Ser Val Val Leu
 4245 4250 4255
 Ser Gly Asp Arg Asp Val Leu Asp Gly Ile Ala Gly Arg Leu Asp Gly
 4260 4265 4270
 Gln Gly Ile Arg Ser Arg Trp Leu Arg Val Ser His Ala Phe His Ser
 4275 4280 4285
 His Arg Met Asp Pro Met Leu Ala Glu Phe Ala Glu Leu Ala Arg Ser
 4290 4295 4300
 Val Asp Tyr Arg Ser Pro Arg Leu Pro Ile Val Ser Thr Leu Thr Gly
 305 4310 4315 4320
 Asn Leu Asp Asp Val Gly Val Met Ala Thr Pro Glu Tyr Trp Val Arg
 4325 4330 4335
 Gln Val Arg Glu Pro Val Arg Phe Ala Asp Gly Val Gln Ala Leu Val
 4340 4345 4350
 Asp Gln Gly Val Asp Thr Ile Val Glu Leu Gly Pro Asp Gly Ala Leu
 4355 4360 4365
 Ser Ser Leu Val Gln Glu Cys Val Ala Glu Ser Gly Arg Ala Thr Gly
 4370 4375 4380
 Ile Pro Leu Val Arg Arg Asp Arg Asp Glu Val Arg Thr Val Leu Asp
 385 4390 4395 4400
 Ala Leu Ala Gln Thr His Thr Arg Gly Gly Ala Val Asp Trp Gly Ser
 4405 4410 4415
 Phe Phe Ala Gly Thr Arg Ala Thr Gln Val Asp Leu Pro Thr Tyr Ala
 4420 4425 4430
 Phe Gln Arg Gln Arg Tyr Trp Leu Glu Pro Ser Asp Ser Gly Asp Val
 4435 4440 4445
 Thr Gly Val Gly Leu Thr Gly Ala Glu His Pro Leu Leu Gly Ala Val
 4450 4455 4460
 Val Pro Val Ala Gly Gly Asp Glu Val Leu Leu Thr Gly Arg Leu Ser
 4465 4470 4475 4480
 Val Gly Thr His Pro Trp Leu Ala Glu His Arg Val Leu Gly Glu Val
 4485 4490 4495
 Val Val Pro Gly Thr Ala Leu Leu Glu Met Ala Trp Arg Ala Gly Ser
 4500 4505 4510
 Gln Val Gly Cys Glu Arg Val Glu Glu Leu Thr Leu Glu Ala Pro Leu
 4515 4520 4525
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 Pro Asp Glu Ala Gly Arg Arg Ser Leu Gln Leu Tyr Ser Arg Gly Ala
 545 4550 4555 4560
 Asp Glu Asp Gly Asp Trp Arg Arg Ile Ala Ser Gly Leu Leu Ala Gln
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Ala Asn Ala Val Pro Pro Ala Asp Ser Thr Ala Trp Pro Pro Asp Gly
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Ala Gly Gln Val Asp Leu Ala Glu Phe Tyr Glu Arg Leu Ala Glu Arg
4595 4600 4605

Gly Leu Thr Tyr Gly Pro Val Phe Gln Gly Leu Arg Ala Ala Trp Arg
4610 4615 4620

His Gly Asp Asp Ile Phe Ala Glu Leu Ala Gly Ser Pro Asp Ala Ser
625 4630 4635 4640

Gly Phe Gly Ile His Pro Ala Leu Leu Asp Ala Ala Leu His Ala Met
4645 4650 4655

Ala Leu Gly Ala Ser Pro Asp Ser Glu Ala Arg Leu Pro Phe Ser Trp
4660 4665 4670

Arg Gly Ala Gln Leu Tyr Arg Ala Glu Gly Ala Ala Leu Arg Val Arg
4675 4680 4685

Leu Ser Pro Leu Gly Ser Gly Ala Val Ser Leu Thr Leu Val Asp Ala
4690 4695 4700

Thr Gly Arg Arg Val Ala Ala Val Glu Ser Leu Ser Thr Arg Pro Val
705 4710 4715 4720

Ser Thr Asp Gln Ile Gly Ala Gly Arg Gly Asp Gln Glu Arg Leu Leu
4725 4730 4735

His Val Glu Trp Val Arg Ser Ala Glu Ser Ala Gly Met Ser Leu Thr
4740 4745 4750

Ser Cys Ala Val Val Gly Leu Gly Glu Pro Glu Trp His Ala Ala Leu
4755 4760 4765

Lys Thr Thr Gly Val Gln Val Glu Ser His Ala Asp Leu Ala Ser Leu
4770 4775 4780

Ala Thr Glu Val Ala Lys Arg Gly Ser Ala Pro Gly Ala Val Ile Val
785 4790 4795 4800

Pro Cys Pro Arg Pro Arg Ala Met Gln Glu Leu Pro Thr Ala Ala Arg
4805 4810 4815

Arg Ala Thr Gln Gln Ala Met Ala Met Leu Gln Gln Trp Leu Ala Asp
4820 4825 4830

Asp Arg Phe Val Ser Thr Arg Leu Ile Leu Leu Thr His Arg Ala Val
4835 4840 4845

Ser Ala Val Ala Gly Glu Asp Val Leu Asp Leu Val His Ala Pro Leu
4850 4855 4860

Trp Gly Leu Val Arg Ser Ala Gln Ala Glu His Pro Asp Arg Phe Ala
865 4870 4875 4880

Leu Ile Asp Met Asp Asp Glu Arg Ala Ser Gln Thr Ala Leu Ala Glu
4885 4890 4895

Ala Leu Thr Ala Gly Glu Ala Gln Leu Ala Val Arg Ser Gly Val Val
4900 4905 4910

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Leu Ala Pro Arg Leu Gly Gln Val Lys Val Ser Gly Gly Glu Ala Phe
 4915 4920 4925
 Arg Trp Asp Glu Gly Thr Val Leu Val Thr Gly Gly Thr Gly Gly Leu
 4930 4935 4940
 Gly Ala Leu Leu Ala Arg His Leu Val Ser Ala His Gly Val Arg His
 945 4950 4955 4960
 Leu Leu Leu Ala Ser Arg Arg Gly Leu Ala Ala Pro Gly Ala Asp Glu
 4965 4970 4975
 Leu Val Ala Glu Leu Glu Gln Ala Gly Ala Asp Val Ala Val Val Ala
 4980 4985 4990
 Cys Asp Ser Ala Asp Arg Asp Ser Leu Ala Arg Leu Val Ala Ser Val
 4995 5000 5005
 Pro Ala Glu Asn Pro Leu Arg Val Val Val His Ala Ala Gly Val Leu
 5010 5015 5020
 Asp Asp Gly Val Leu Met Ser Met Ser Pro Glu Arg Leu Asp Ala Val
 025 5030 5035 5040
 Leu Arg Pro Lys Val Asp Ala Ala Trp Tyr Leu His Glu Leu Thr Arg
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 Glu Leu Gly Leu Ser Ala Phe Val Leu Phe Ser Ser Val Ala Gly Leu
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 Phe Gly Gly Ala Gly Gln Ser Asn Tyr Ala Ala Gly Asn Ala Phe Leu
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 Asp Ala Leu Ala His Cys Arg Gln Ala Gln Gly Leu Pro Ala Leu Ser
 5090 5095 5100
 Leu Ala Ser Gly Leu Trp Ala Ser Ile Asp Gly Met Ala Gly Asp Leu
 105 5110 5115 5120
 Ala Ala Ala Asp Val Glu Arg Leu Ser Arg Ala Gly Ile Gly Pro Leu
 5125 5130 5135
 Ser Ala Pro Gly Gly Leu Ala Leu Phe Asp Ala Ala Val Gly Ser Asp
 5140 5145 5150
 Glu Pro Leu Leu Ala Pro Val Arg Leu Asp Val Glu Ala Leu Arg Val
 5155 5160 5165
 Gln Ala Arg Ser Val Gln Thr Arg Ile Pro Glu Met Leu His Gly Met
 5170 5175 5180
 Ala Met Gly Pro Ser Arg Arg Thr Pro Phe Thr Ser Arg Val Glu Pro
 185 5190 5195 5200
 Leu His Glu Arg Leu Ala Gly Leu Ser Glu Gly Glu Arg Arg Gln Gln
 5205 5210 5215
 Val Leu Gln Arg Val Arg Ala Asp Ile Ala Val Val Leu Gly His Gly
 5220 5225 5230
 Arg Ser Ser Asp Val Asp Ile Glu Lys Pro Leu Ala Glu Leu Gly Phe
 5235 5240 5245

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Asp Ser Leu Thr Ala Ile Glu Leu Arg Asn Arg Leu Ala Thr Ala Thr
 5250 5255 5260
 Gly Leu Arg Leu Pro Ala Thr Leu Ala Phe Asp His Gly Thr Ala Ala
 265 5270 5275 5280
 Ala Leu Ala Gln His Val Cys Ala Gln Leu Gly Thr Ala Thr Ala Pro
 5285 5290 5295
 Ala Pro Arg Arg Thr Asp Asp Asn Asp Ala Thr Glu Pro Val Arg Ser
 5300 5305 5310
 Leu Phe Gln Gln Ala Tyr Ala Ala Gly Arg Ile Leu Asp Gly Met Asp
 5315 5320 5325
 Leu Val Lys Val Ala Ala Gln Leu Arg Pro Val Phe Gly Ser Pro Gly
 5330 5335 5340
 Glu Leu Glu Ser Leu Pro Lys Pro Val Gln Leu Ser Arg Gly Pro Glu
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 Glu Leu Ala Leu Val Cys Met Pro Ala Leu Ile Gly Met Pro Pro Ala
 5365 5370 5375
 Gln Gln Tyr Ala Arg Ile Ala Ala Gly Phe Arg Asp Val Arg Asp Val
 5380 5385 5390
 Ser Val Ile Pro Met Pro Gly Phe Ile Ala Gly Glu Pro Leu Pro Ser
 5395 5400 5405
 Ala Ile Glu Val Ala Val Arg Thr Gln Ala Glu Ala Val Leu Gln Glu
 5410 5415 5420
 Phe Ala Gly Gly Ser Phe Val Leu Val Gly His Ser Ser Gly Gly Trp
 425 5430 5435 5440
 Leu Ala His Glu Val Ala Gly Glu Leu Glu Arg Arg Gly Val Val Pro
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 Ala Gly Val Val Leu Leu Asp Thr Tyr Ile Pro Gly Glu Ile Thr Pro
 5460 5465 5470
 Arg Phe Ser Val Ala Met Ala His Arg Thr Tyr Glu Lys Leu Ala Thr
 5475 5480 5485
 Phe Thr Asp Met Gln Asp Val Gly Ile Thr Ala Met Gly Gly Tyr Phe
 5490 5495 5500
 Arg Met Phe Thr Glu Trp Thr Pro Thr Pro Ile Gly Ala Pro Thr Leu
 5505 5510 5515 5520
 Phe Val Arg Thr Glu Asp Cys Val Ala Asp Pro Glu Gly Arg Pro Trp
 5525 5530 5535
 Thr Asp Asp Ser Trp Arg Pro Gly Trp Thr Leu Ala Asp Ala Thr Val
 5540 5545 5550
 Gln Val Pro Gly Asp His Phe Ser Met Met Asp Glu His Ala Gly Ser
 5555 5560 5565
 Thr Ala Gln Ala Val Ala Ser Trp Leu Asp Lys Leu Asn Gln Arg Thr
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Ala Arg Gln Arg
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LeA33955-US

<400> 52

| | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| atg | cgg | att | ctg | gtc | acc | ggc | gga | gcc | ggt | ttc | atc | ggc | tcg | cac | tac | 48 |
| Met | Arg | Ile | Leu | Val | Thr | Gly | Gly | Ala | Gly | Phe | Ile | Gly | Ser | His | Tyr | |
| 1 | | | | 5 | | | | | 10 | | | | | 15 | | |
| ggt | cgg | cag | ttg | ctc | ggt | ggt | gcg | tac | ccc | gca | ttc | gcc | gac | gcc | gac | 96 |
| Val | Arg | Gln | Leu | Leu | Gly | Gly | Ala | Tyr | Pro | Ala | Phe | Ala | Asp | Ala | Asp | |
| | | | 20 | | | | | 25 | | | | | 30 | | | |
| gtg | gtc | gtg | ctc | gac | aag | ctc | acc | tac | gcc | ggc | aac | gag | gcg | aac | ctg | 144 |
| Val | Val | Val | Leu | Asp | Lys | Leu | Thr | Tyr | Ala | Gly | Asn | Glu | Ala | Asn | Leu | |
| | | 35 | | | | | 40 | | | | | 45 | | | | |
| gcg | ccg | gtc | gcg | gac | aac | ccc | cgg | ctg | aag | ttc | gtc | tgc | ggc | gac | atc | 192 |
| Ala | Pro | Val | Ala | Asp | Asn | Pro | Arg | Leu | Lys | Phe | Val | Cys | Gly | Asp | Ile | |
| | 50 | | | | | 55 | | | | | 60 | | | | | |
| tgc | gac | cgc | gaa | ctg | ggt | ggc | ggc | ctg | atg | tcc | ggc | gtg | gac | gtg | gtg | 240 |
| Cys | Asp | Arg | Glu | Leu | Val | Gly | Gly | Leu | Met | Ser | Gly | Val | Asp | Val | Val | |
| 65 | | | | | 70 | | | | | 75 | | | | | 80 | |
| gtg | cac | ttc | gcc | gcc | gaa | acc | cac | gtc | gac | cgc | tcg | atc | acc | ggc | tcg | 288 |
| Val | His | Phe | Ala | Ala | Glu | Thr | His | Val | Asp | Arg | Ser | Ile | Thr | Gly | Ser | |
| | | | | 85 | | | | | 90 | | | | | 95 | | |
| gac | gcc | ttc | gtg | atc | acc | aac | gtg | gtc | ggc | acc | aac | gtg | ctg | ctg | cag | 336 |
| Asp | Ala | Phe | Val | Ile | Thr | Asn | Val | Val | Gly | Thr | Asn | Val | Leu | Leu | Gln | |
| | | | 100 | | | | | 105 | | | | | 110 | | | |
| gcc | gcg | ctc | gac | gcc | gag | atc | ggc | aag | ttc | gtg | cac | gtt | tcc | acc | gac | 384 |
| Ala | Ala | Leu | Asp | Ala | Glu | Ile | Gly | Lys | Phe | Val | His | Val | Ser | Thr | Asp | |
| | | 115 | | | | | 120 | | | | | 125 | | | | |
| gag | gtc | tac | ggc | tcc | atc | gag | gac | ggc | tcg | tgg | ccc | gaa | gac | cac | gcg | 432 |
| Glu | Val | Tyr | Gly | Ser | Ile | Glu | Asp | Gly | Ser | Trp | Pro | Glu | Asp | His | Ala | |
| | 130 | | | | | 135 | | | | | 140 | | | | | |
| ctg | gag | ccg | aat | tcc | ccg | tac | tcg | gcg | gcg | aaa | gcg | ggc | tcg | gac | ctg | 480 |
| Leu | Glu | Pro | Asn | Ser | Pro | Tyr | Ser | Ala | Ala | Lys | Ala | Gly | Ser | Asp | Leu | |
| 145 | | | | | 150 | | | | | 155 | | | | | 160 | |
| ctg | gcc | cgc | gcc | tac | cac | cgc | acc | cac | gga | ctg | ccg | gtg | tgc | atc | acc | 528 |
| Leu | Ala | Arg | Ala | Tyr | His | Arg | Thr | His | Gly | Leu | Pro | Val | Cys | Ile | Thr | |
| | | | | 165 | | | | | 170 | | | | | 175 | | |
| cgc | tgc | tcc | aac | aac | tac | ggg | ccc | tac | cag | ttc | ccg | gag | aag | gtg | ctg | 576 |
| Arg | Cys | Ser | Asn | Asn | Tyr | Gly | Pro | Tyr | Gln | Phe | Pro | Glu | Lys | Val | Leu | |
| | | | 180 | | | | | 185 | | | | | 190 | | | |
| ccg | ctg | ttc | atc | acg | aac | ctg | atg | gac | ggc | agc | cag | gtg | ccg | ctc | tac | 624 |
| Pro | Leu | Phe | Ile | Thr | Asn | Leu | Met | Asp | Gly | Ser | Gln | Val | Pro | Leu | Tyr | |
| | | 195 | | | | | 200 | | | | | 205 | | | | |
| ggc | gac | ggg | ctc | aac | gtg | cgg | gac | tgg | ctg | cac | gtc | agc | gac | cac | tgc | 672 |
| Gly | Asp | Gly | Leu | Asn | Val | Arg | Asp | Trp | Leu | His | Val | Ser | Asp | His | Cys | |
| | 210 | | | | | 215 | | | | | 220 | | | | | |
| cgg | ggc | atc | cag | ctg | gtg | gcc | gac | tcc | ggg | cgc | gcg | ggc | gag | atc | tac | 720 |
| Arg | Gly | Ile | Gln | Leu | Val | Ala | Asp | Ser | Gly | Arg | Ala | Gly | Glu | Ile | Tyr | |
| 225 | | | | | 230 | | | | 235 | | | | | 240 | | |
| aac | atc | ggc | ggc | ggc | acc | gag | ctg | acc | aac | aac | gag | ctg | acc | gag | cgg | 768 |

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| | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|--|
| Asn | Ile | Gly | Gly | Gly | Thr | Glu | Leu | Thr | Asn | Asn | Glu | Leu | Thr | Glu | Arg | | |
| | | | | 245 | | | | | 250 | | | | | 255 | | | |
| ctg | ctg | gca | gag | ctg | ggc | ctc | gac | tgg | tcg | gtg | gtg | cgg | ccg | gtc | acc | 816 | |
| Leu | Leu | Ala | Glu | Leu | Gly | Leu | Asp | Trp | Ser | Val | Val | Arg | Pro | Val | Thr | | |
| | | | 260 | | | | | 265 | | | | | 270 | | | | |
| gac | cgc | aag | ggc | cac | gac | cgc | cgc | tac | tcg | gtg | gac | cac | agc | aag | atc | 864 | |
| Asp | Arg | Lys | Gly | His | Asp | Arg | Arg | Tyr | Ser | Val | Asp | His | Ser | Lys | Ile | | |
| | | 275 | | | | | 280 | | | | | 285 | | | | | |
| gtc | gag | gaa | ctg | ggg | tac | gcg | ccg | cag | gtc | gac | ttc | gag | acc | ggg | ctg | 912 | |
| Val | Glu | Glu | Leu | Gly | Tyr | Ala | Pro | Gln | Val | Asp | Phe | Glu | Thr | Gly | Leu | | |
| | 290 | | | | | 295 | | | | | 300 | | | | | | |
| cgc | gag | aca | atc | cgc | tgg | tac | cag | gac | aac | cgg | gac | tgg | tgg | gag | ccg | 960 | |
| Arg | Glu | Thr | Ile | Arg | Trp | Tyr | Gln | Asp | Asn | Arg | Asp | Trp | Trp | Glu | Pro | | |
| 305 | | | | | 310 | | | | | 315 | | | | | 320 | | |
| ctg | aag | gcc | cga | tcg | gcg | gtg | gct | cga | tga | | | | | | | 990 | |
| Leu | Lys | Ala | Arg | Ser | Ala | Val | Ala | Arg | | | | | | | | | |
| | | | | 325 | | | | | | | | | | | | | |

<210> 53
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 <212> PRT
 <213> Saccharopolyspora spinosa

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 35 40 45
 Ala Pro Val Ala Asp Asn Pro Arg Leu Lys Phe Val Cys Gly Asp Ile
 50 55 60
 Cys Asp Arg Glu Leu Val Gly Gly Leu Met Ser Gly Val Asp Val Val
 65 70 75 80
 Val His Phe Ala Ala Glu Thr His Val Asp Arg Ser Ile Thr Gly Ser
 85 90 95
 Asp Ala Phe Val Ile Thr Asn Val Val Gly Thr Asn Val Leu Leu Gln
 100 105 110
 Ala Ala Leu Asp Ala Glu Ile Gly Lys Phe Val His Val Ser Thr Asp
 115 120 125
 Glu Val Tyr Gly Ser Ile Glu Asp Gly Ser Trp Pro Glu Asp His Ala
 130 135 140
 Leu Glu Pro Asn Ser Pro Tyr Ser Ala Ala Lys Ala Gly Ser Asp Leu
 145 150 155 160
 Leu Ala Arg Ala Tyr His Arg Thr His Gly Leu Pro Val Cys Ile Thr
 165 170 175

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| | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Arg | Cys | Ser | Asn | Asn | Tyr | Gly | Pro | Tyr | Gln | Phe | Pro | Glu | Lys | Val | Leu |
| | | | 180 | | | | | 185 | | | | | 190 | | |
| Pro | Leu | Phe | Ile | Thr | Asn | Leu | Met | Asp | Gly | Ser | Gln | Val | Pro | Leu | Tyr |
| | | 195 | | | | | 200 | | | | | 205 | | | |
| Gly | Asp | Gly | Leu | Asn | Val | Arg | Asp | Trp | Leu | His | Val | Ser | Asp | His | Cys |
| | 210 | | | | | 215 | | | | | 220 | | | | |
| Arg | Gly | Ile | Gln | Leu | Val | Ala | Asp | Ser | Gly | Arg | Ala | Gly | Glu | Ile | Tyr |
| | 225 | | | | 230 | | | | | 235 | | | | | 240 |
| Asn | Ile | Gly | Gly | Gly | Thr | Glu | Leu | Thr | Asn | Asn | Glu | Leu | Thr | Glu | Arg |
| | | | | 245 | | | | | 250 | | | | | 255 | |
| Leu | Leu | Ala | Glu | Leu | Gly | Leu | Asp | Trp | Ser | Val | Val | Arg | Pro | Val | Thr |
| | | | 260 | | | | | 265 | | | | | 270 | | |
| Asp | Arg | Lys | Gly | His | Asp | Arg | Arg | Tyr | Ser | Val | Asp | His | Ser | Lys | Ile |
| | | 275 | | | | | 280 | | | | | 285 | | | |
| Val | Glu | Glu | Leu | Gly | Tyr | Ala | Pro | Gln | Val | Asp | Phe | Glu | Thr | Gly | Leu |
| | 290 | | | | | 295 | | | | | 300 | | | | |
| Arg | Glu | Thr | Ile | Arg | Trp | Tyr | Gln | Asp | Asn | Arg | Asp | Trp | Trp | Glu | Pro |
| | 305 | | | | 310 | | | | | 315 | | | | | 320 |
| Leu | Lys | Ala | Arg | Ser | Ala | Val | Ala | Arg | | | | | | | |
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<212> DNA

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<220>

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<400> 54

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| Met | Ser | Arg | Leu | Ala | Val | Leu | Val | Pro | Gly | Gly | Arg | Gly | Gln | Leu | Gly | |
| 1 | | | | 5 | | | | | 10 | | | | | 15 | | |
| tcg | gag | ctg | gcc | cgg | atc | ctc | ccc | gcg | cgg | acg | ggg | gcg | ctg | gtg | cac | 96 |
| Ser | Glu | Leu | Ala | Arg | Ile | Leu | Pro | Ala | Arg | Thr | Gly | Ala | Leu | Val | His | |
| | | | 20 | | | | | 25 | | | | | 30 | | | |
| cgg | ccg | ggt | tcc | ggg | gaa | ctg | gac | gtc | acc | gac | gcc | gag | gag | gtc | gcc | 144 |
| Arg | Pro | Gly | Ser | Gly | Glu | Leu | Asp | Val | Thr | Asp | Ala | Glu | Glu | Val | Ala | |
| | | 35 | | | | | 40 | | | | | 45 | | | | |
| gac | gcg | ttg | ggt | tcc | ttc | gcg | gag | acg | gcg | aag | gac | gcg | gag | ctg | cga | 192 |
| Asp | Ala | Leu | Gly | Ser | Phe | Ala | Glu | Thr | Ala | Lys | Asp | Ala | Glu | Leu | Arg | |
| | 50 | | | | | 55 | | | | | 60 | | | | | |
| ccg | gtg | gtg | atc | aac | gcc | gcg | gcg | tac | acg | gcg | gtg | gac | gcg | gcc | gag | 240 |
| Pro | Val | Val | Ile | Asn | Ala | Ala | Ala | Tyr | Thr | Ala | Val | Asp | Ala | Ala | Glu | |
| | 65 | | | | 70 | | | | | 75 | | | | | 80 | |

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| | |
|--|-----|
| tcc gac ccg gac cgc gcg gcc cgg atc aac gcc gaa ggc gcg gcc tcg Ser Asp Pro Asp Arg 85 Ala Ala Arg Ile Asn 90 Ala Glu Gly Ala Ala 95 Ser | 288 |
| ctg gcg aaa gcg tgc cgg agc agc ggt ctg ccc ctg gtg cac gtg tcg Leu Ala Lys 100 Ala Cys Arg Ser Ser Gly 105 Leu Pro Leu Val His Val Ser | 336 |
| acg gat tac gtg ttc ccc ggt gat ggg gcc cgg ccg tac gag ccg acg Thr Asp Tyr 115 Val Phe Pro Gly Asp Gly Ala Arg Pro Tyr 125 Glu Pro Thr | 384 |
| gac ccg acc ggg ccg cga tcg gtc tac ggg cgc acc aag ctc gaa ggc Asp Pro 130 Thr Gly Pro Arg Ser 135 Val Tyr Gly Arg Thr 140 Lys Leu Glu Gly | 432 |
| gaa ccg gcc gtg ctg gag tcc ggc gcg cgg gcc tgg gtg gtg cgc acg Glu Arg Ala Val Leu Glu Ser Gly Ala Arg Ala Trp Val Val Arg Thr 160 | 480 |
| gca tgg gtg tac ggc gcg agc ggc aag aac ttc ctg aaa acg atg atc Ala Trp Val Tyr 165 Gly Ala Ser Gly Lys Asn 170 Phe Leu Lys Thr Met Ile 175 | 528 |
| cgc ctc tcg ggg gag cgc gac acg ctg tcc gtt gtg gac gat cag atc Arg Leu Ser 180 Gly Glu Arg Asp Thr 185 Ser Val Val Asp 190 Asp Gln Ile | 576 |
| ggc tcg ccg act tgg gcg gcg gac ctg gcg agc ggc ctg ctg gag ctg Gly Ser Pro 195 Thr Trp Ala Ala Asp 200 Leu Ala Ser Gly Leu Leu Glu Leu | 624 |
| gcc gaa ccg gtc gcc gaa cgc cgt gga ccg gag cag aag gtg ctg cac Ala Glu Arg Val Ala Glu Arg Arg Gly Pro Glu Gln Lys Val Leu His 210 215 220 | 672 |
| tgc acc aat tcc ggc cag gtg acc tgg tac gag ttc gcg ccg gcg atc Cys Thr Asn Ser Gly Gln Val Thr Trp Tyr 235 Phe Ala Arg Ala Ile 240 | 720 |
| ttc gcg gaa ttc ggc ctg gac gag aac cgc gtc cac ccg tgc acg acg Phe Ala Glu Phe Gly Leu Asp Glu Asn Arg 250 Val His Pro Cys Thr Thr 255 | 768 |
| gcg gac ttc ccc ctc ccg gcg cac cgc ccg gcc tac tcg gtc ctg tcc Ala Asp Phe Pro Leu Pro Ala His Arg 265 Pro Ala Tyr Ser Val Leu Ser 270 | 816 |
| gac gtg gcg tgg cga gag gcg ggc ctg acc ccg atg cgc acc tgg ccg Asp Val Ala Trp Arg Glu Ala Gly 280 Leu Thr Pro Met Arg 285 Thr Trp Arg | 864 |
| gaa gcc ctg gcg gcg gcc ttc gag aaa gac ggc gaa acc ctc cga acc Glu Ala Leu Ala Ala Ala Phe 295 Glu Lys Asp Gly Glu Thr Leu Arg Thr 300 | 912 |
| cgc tga Arg 305 | 918 |

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<212> PRT

<213> Saccharopolyspora spinosa

<400> 55

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Arg Pro Gly Ser Gly Glu Leu Asp Val Thr Asp Ala Glu Glu Val Ala
      35      40      45
Asp Ala Leu Gly Ser Phe Ala Glu Thr Ala Lys Asp Ala Glu Leu Arg
      50      55      60
Pro Val Val Ile Asn Ala Ala Tyr Thr Ala Val Asp Ala Ala Glu
      65      70      75      80
Ser Asp Pro Asp Arg Ala Ala Arg Ile Asn Ala Glu Gly Ala Ala Ser
      85      90      95
Leu Ala Lys Ala Cys Arg Ser Ser Gly Leu Pro Leu Val His Val Ser
      100      105      110
Thr Asp Tyr Val Phe Pro Gly Asp Gly Ala Arg Pro Tyr Glu Pro Thr
      115      120      125
Asp Pro Thr Gly Pro Arg Ser Val Tyr Gly Arg Thr Lys Leu Glu Gly
      130      135      140
Glu Arg Ala Val Leu Glu Ser Gly Ala Arg Ala Trp Val Val Arg Thr
      145      150      155      160
Ala Trp Val Tyr Gly Ala Ser Gly Lys Asn Phe Leu Lys Thr Met Ile
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Arg Leu Ser Gly Glu Arg Asp Thr Leu Ser Val Val Asp Asp Gln Ile
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Gly Ser Pro Thr Trp Ala Ala Asp Leu Ala Ser Gly Leu Leu Glu Leu
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Ala Glu Arg Val Ala Glu Arg Arg Gly Pro Glu Gln Lys Val Leu His
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Cys Thr Asn Ser Gly Gln Val Thr Trp Tyr Glu Phe Ala Arg Ala Ile
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Phe Ala Glu Phe Gly Leu Asp Glu Asn Arg Val His Pro Cys Thr Thr
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Ala Asp Phe Pro Leu Pro Ala His Arg Pro Ala Tyr Ser Val Leu Ser
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Asp Val Ala Trp Arg Glu Ala Gly Leu Thr Pro Met Arg Thr Trp Arg
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Glu Ala Leu Ala Ala Ala Phe Glu Lys Asp Gly Glu Thr Leu Arg Thr
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Arg
305

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